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ENVIRONMENTAL RADIATION DATA

REPORT 151

July–September 2012

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/radnet/radnet-data/erd.html and 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	0.0015
	Water	pCi/L	2
	Precipitation	pCi/L	2
Tritium	Water	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m³	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m³	0.75
	Water	pCi/L	0.1
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 120,000 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 MDC for air is based on an assumed total sample volume of 120,000 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 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
AK: Anchorage	8	0.002	0.000	0.001
AK: Fairbanks	9	0.003	0.001	0.002
AK: Juneau	8	0.002	0.000	0.001
AL: Birmingham	9	0.020	0.004	0.010
AL: Montgomery/408	9	0.020	0.007	0.012
AR: Fort Smith	4	0.017	0.009	0.011
AR: Little Rock	9	0.019	0.005	0.010
AZ: Phoenix	9	0.014	0.009	0.011
AZ: Phoenix/956	9	0.011	0.006	0.008
AZ: Tucson	8	0.012	0.007	0.009
CA: Anaheim	9	0.009	0.003	0.006
CA: Bakersfield	8	0.015	0.004	0.009
CA: Eureka	4	0.003	0.001	0.002
CA: Fresno	4	0.009	0.004	0.006
CA: Los Angeles	5	0.008	0.004	0.006
CA: Richmond	5	0.003	0.002	0.002
CA: Riverside	7	0.007	0.004	0.006
CA: Sacramento	8	0.007	0.002	0.003
CA: San Bernardino Cty.	6	0.013	0.006	0.008
CA: San Diego	2	0.006	0.004	0.005
CA: San Francisco	9	0.003	0.001	0.001
CA: San Jose	7	0.006	0.002	0.003
CO: Denver	9	0.013	0.006	0.008
CO: Grand Junction	5	0.011	0.006	0.009
CT: Hartford	9	0.009	0.002	0.006
DC: Washington	9	0.011	0.006	0.009
DE: Dover	6	0.011	0.006	0.008
FL: Jacksonville	8	0.009	0.002	0.006
FL: Miami	3	0.011	0.005	0.007
FL: Orlando	9	0.009	0.003	0.006
FL: Tallahassee	5	0.014	0.005	0.008
FL: Tampa	9	0.011	0.003	0.007
GA: Atlanta	4	0.014	0.005	0.008
GA: Augusta	6	0.023	0.004	0.010
HI: Hilo	9	0.003	0.002	0.002
HI: Honolulu	9	0.003	0.001	0.002
IA: Des Moines	4	0.013	0.006	0.010
IA: Mason City	5	0.012	0.007	0.010

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
ID: Idaho Falls	6	0.012	0.008	0.010
IL: Aurora	7	0.016	0.007	0.011
IL: Chicago	8	0.015	0.005	0.010
IN: Fort Wayne	3	0.014	0.011	0.013
IN: Indianapolis	9	0.016	0.005	0.010
KS: Kansas City	6	0.012	0.006	0.010
KS: Topeka	9	0.016	0.007	0.011
KS: Wichita	8	0.013	0.009	0.011
KY: Lexington	6	0.025	0.008	0.016
KY: Louisville	4	0.014	0.005	0.010
LA: Baton Rouge	8	0.009	0.002	0.005
LA: Shreveport	8	0.011	0.004	0.007
MA: Boston	9	0.009	0.002	0.006
MA: Worcester	9	0.015	0.004	0.009
MD: Baltimore	8	0.014	0.007	0.010
ME: Orono	4	0.010	0.004	0.007
ME: Portland	9	0.011	0.004	0.006
MI: Bay City 48708	9	0.009	0.005	0.006
MI: Detroit	8	0.011	0.005	0.008
MI: Grand Rapids	4	0.015	0.010	0.013
MI: Lansing	9	0.029	0.013	0.021
MN: Duluth	9	0.016	0.004	0.008
MN: St. Paul	5	0.010	0.007	0.008
MO: Jefferson City	9	0.016	0.008	0.012
MO: Springfield	6	0.017	0.009	0.013
MO: St. Louis	1	0.007	0.007	0.007
MS: Jackson/Deq	2	0.018	0.014	0.016
MT: Billings	3	0.016	0.010	0.013
NC: Charlotte	8	0.014	0.005	0.009
NC: Raleigh	4	0.009	0.004	0.007
NC: Wilmington	2	0.011	0.009	0.010
ND: Bismarck	6	0.012	0.007	0.010
NE: Kearney	9	0.018	0.008	0.011
NE: Lincoln	9	0.017	0.007	0.012
NE: Omaha	5	0.023	0.012	0.017
NH: Concord	7	0.011	0.004	0.007
NJ: Edison	7	0.007	0.003	0.006
NM: Albuquerque	3	0.008	0.006	0.007

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NM: Carlsbad	6	0.019	0.011	0.014
NM: Navajo Lake St Park	4	0.011	0.008	0.010
NV: Las Vegas/913	6	0.010	0.006	0.008
NV: Reno	9	0.017	0.007	0.010
NY: Albany	4	0.016	0.009	0.011
NY: Lockport	9	0.009	0.005	0.007
NY: New York City	4	0.011	0.006	0.009
NY: Rochester	7	0.010	0.006	0.007
NY: Syracuse	4	0.010	0.007	0.008
NY: Yaphank	6	0.007	0.004	0.006
OH: Cincinnati	7	0.016	0.006	0.010
OH: Cleveland	5	0.016	0.012	0.013
OH: Painesville	7	0.011	0.007	0.009
OH: Toledo	8	0.016	0.009	0.012
OK: Oklahoma City	8	0.027	0.008	0.015
OK: Tulsa	8	0.016	0.008	0.011
OR: Corvallis	9	0.005	0.002	0.003
OR: Portland	8	0.003	0.001	0.002
PA: Philadelphia	1	0.005	0.005	0.005
PA: Pittsburgh	6	0.013	0.007	0.009
PR: San Juan	9	0.027	0.006	0.011
RI: Providence	3	0.006	0.005	0.006
SC: Columbia	6	0.016	0.006	0.011
SD: Pierre	9	0.015	0.008	0.011
SD: Rapid City	6	0.015	0.010	0.013
TN: Knoxville	7	0.023	0.007	0.016
TN: Memphis	5	0.020	0.005	0.011
TN: Nashville	1	0.007	0.007	0.007
TN: Oak Ridge/Bethel	9	0.017	0.007	0.010
TN: Oak Ridge/K25	9	0.019	0.006	0.011
TN: Oak Ridge/Melton	9	0.020	0.007	0.012
TN: Oak Ridge/Y12 E	9	0.016	0.006	0.011
TN: Oak Ridge/Y12 W	9	0.017	0.005	0.009
TX: Austin	3	0.012	0.008	0.009
TX: Dallas	9	0.017	0.005	0.010
TX: El Paso	5	0.017	0.013	0.015
TX: Ft. Worth	9	0.018	0.006	0.009
TX: Harlingen	5	0.012	0.007	0.009

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Houston	9	0.019	0.005	0.011
TX: Laredo	1	0.008	0.008	0.008
TX: Lubbock	6	0.013	0.007	0.010
TX: San Angelo	8	0.011	0.007	0.009
TX: San Antonio	9	0.011	0.006	0.008
UT: Salt Lake City	8	0.014	0.010	0.012
VA: Harrisonburg	5	0.015	0.006	0.010
VA: Lynchburg	6	0.015	0.008	0.011
VA: Richmond	8	0.016	0.005	0.011
VA: Virginia Beach	8	0.012	0.004	0.008
VT: Burlington	4	0.007	0.005	0.006
WA: Olympia	9	0.004	0.001	0.002
WA: Richland	8	0.009	0.004	0.006
WA: Seattle	4	0.003	0.001	0.002
WA: Spokane	9	0.012	0.003	0.007
WI: Madison	1	0.017	0.017	0.017
WI: Milwaukee	8	0.012	0.005	0.007
WV: Charleston	6	0.019	0.008	0.012

Table 3
Gross Beta in Airborne Particulates
August 2012

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AK: Anchorage	9	0.002	0.000	0.001
AK: Fairbanks	9	0.004	0.001	0.002
AK: Juneau	6	0.002	0.000	0.001
AL: Birmingham	7	0.020	0.007	0.011
AL: Montgomery/408	9	0.020	0.006	0.012
AR: Fort Smith	2	0.014	0.011	0.012
AR: Little Rock	7	0.017	0.011	0.013
AZ: Phoenix	9	0.016	0.007	0.012
AZ: Phoenix/956	9	0.015	0.005	0.009
AZ: Tucson	9	0.013	0.007	0.010
AZ: Yuma	2	0.016	0.005	0.010
CA: Anaheim	7	0.010	0.005	0.007
CA: Bakersfield	6	0.017	0.007	0.012
CA: Eureka	5	0.002	0.001	0.002
CA: Fresno	4	0.008	0.005	0.007
CA: Los Angeles	4	0.008	0.006	0.008
CA: Richmond	4	0.005	0.002	0.003
CA: Riverside	9	0.008	0.007	0.008
CA: Sacramento	9	0.007	0.002	0.004
CA: San Bernardino Cty.	10	0.013	0.009	0.011
CA: San Diego	5	0.007	0.004	0.006
CA: San Francisco	9	0.004	0.001	0.002
CA: San Jose	9	0.007	0.002	0.004
CO: Colorado Springs	3	0.016	0.010	0.013
CO: Denver	9	0.019	0.006	0.013
CO: Grand Junction	6	0.021	0.006	0.012
CT: Hartford	8	0.010	0.004	0.007
DC: Washington	9	0.012	0.006	0.010
DE: Dover	4	0.009	0.006	0.008
FL: Jacksonville	8	0.009	0.003	0.005
FL: Miami	2	0.005	0.005	0.005
FL: Orlando	8	0.008	0.003	0.005
FL: Tallahassee	3	0.008	0.007	0.007
FL: Tampa	7	0.010	0.003	0.006
GA: Atlanta	4	0.013	0.006	0.010
GA: Augusta	3	0.011	0.004	0.007
HI: Hilo	9	0.005	0.001	0.003
HI: Honolulu	9	0.004	0.002	0.002

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
IA: Des Moines	6	0.019	0.007	0.012
IA: Mason City	5	0.014	0.003	0.007
IL: Aurora	9	0.017	0.006	0.010
IL: Champaign	1	0.018	0.018	0.018
IL: Chicago	9	0.012	0.005	0.008
IN: Fort Wayne	4	0.022	0.009	0.014
IN: Indianapolis	9	0.018	0.006	0.010
KS: Kansas City	8	0.015	0.008	0.010
KS: Topeka	8	0.018	0.008	0.012
KS: Wichita	8	0.019	0.009	0.012
KY: Lexington	7	0.023	0.006	0.014
KY: Louisville	7	0.018	0.007	0.011
LA: Baton Rouge	7	0.009	0.003	0.006
LA: Shreveport	9	0.012	0.006	0.009
MA: Boston	9	0.010	0.006	0.007
MA: Worcester	9	0.015	0.005	0.009
MD: Baltimore	8	0.015	0.010	0.013
ME: Orono	5	0.008	0.006	0.007
ME: Portland	9	0.010	0.004	0.006
MI: Bay City 48708	7	0.016	0.004	0.007
MI: Detroit	7	0.016	0.006	0.008
MI: Grand Rapids	5	0.014	0.006	0.009
MI: Lansing	9	0.046	0.010	0.020
MN: Duluth	4	0.012	0.005	0.007
MN: St. Paul	2	0.015	0.005	0.010
MO: Jefferson City	9	0.022	0.008	0.013
MO: Springfield	6	0.016	0.011	0.014
MO: St. Louis	2	0.013	0.009	0.011
MT: Billings	3	0.015	0.011	0.014
NC: Charlotte	9	0.013	0.004	0.009
NC: Raleigh	5	0.010	0.006	0.007
NC: Wilmington	5	0.010	0.006	0.008
ND: Bismarck	8	0.014	0.007	0.009
NE: Kearney	9	0.014	0.006	0.009
NE: Lincoln	8	0.019	0.008	0.013
NE: Omaha	4	0.014	0.007	0.010
NH: Concord	5	0.008	0.002	0.006
NJ: Edison	7	0.010	0.004	0.007

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NM: Albuquerque	5	0.010	0.005	0.008
NM: Carlsbad	7	0.021	0.011	0.016
NM: Navajo Lake St Park	4	0.020	0.008	0.013
NV: Las Vegas/913	6	0.013	0.005	0.009
NV: Reno	9	0.018	0.009	0.014
NY: Albany	1	0.012	0.012	0.012
NY: Lockport	9	0.012	0.003	0.007
NY: New York City	5	0.008	0.006	0.007
NY: Rochester	7	0.013	0.004	0.008
NY: Syracuse	4	0.010	0.006	0.008
NY: Yaphank	8	0.007	0.004	0.006
OH: Cincinnati	8	0.017	0.004	0.010
OH: Cleveland	7	0.018	0.005	0.010
OH: Painesville	6	0.012	0.006	0.009
OH: Toledo	8	0.013	0.004	0.008
OK: Oklahoma City	8	0.017	0.010	0.013
OK: Tulsa	6	0.020	0.008	0.013
OR: Corvallis	8	0.004	0.002	0.003
OR: Portland	9	0.004	0.002	0.003
PA: Philadelphia	5	0.008	0.006	0.007
PA: Pittsburgh	5	0.015	0.009	0.011
PR: San Juan	5	0.025	0.006	0.012
RI: Providence	2	0.008	0.007	0.007
SC: Barnwell	1	0.008	0.008	0.008
SC: Columbia	7	0.014	0.003	0.009
SD: Pierre	9	0.019	0.005	0.009
SD: Rapid City	7	0.022	0.010	0.014
TN: Knoxville	5	0.028	0.010	0.019
TN: Memphis	3	0.015	0.009	0.012
TN: Nashville	9	0.019	0.008	0.012
TN: Oak Ridge/Bethel	9	0.024	0.010	0.015
TN: Oak Ridge/K25	9	0.022	0.010	0.014
TN: Oak Ridge/Melton	9	0.023	0.012	0.015
TN: Oak Ridge/Y12 E	9	0.023	0.009	0.015
TN: Oak Ridge/Y12 W	9	0.021	0.007	0.013
TX: Austin	4	0.015	0.010	0.013
TX: Dallas	7	0.014	0.010	0.012
TX: El Paso	8	0.027	0.012	0.018

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2012

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
TX: Ft. Worth	9	0.012	0.006	0.010
TX: Harlingen	4	0.009	0.002	0.007
TX: Houston	9	0.015	0.010	0.013
TX: Laredo	5	0.009	0.006	0.007
TX: Lubbock	4	0.013	0.009	0.011
TX: San Angelo	8	0.015	0.007	0.010
TX: San Antonio	8	0.012	0.007	0.009
UT: Salt Lake City	8	0.019	0.008	0.015
VA: Harrisonburg	8	0.021	0.007	0.014
VA: Lynchburg	9	0.014	0.009	0.012
VA: Richmond	9	0.013	0.007	0.011
VA: Virginia Beach	9	0.012	0.005	0.008
VT: Burlington	8	0.010	0.003	0.007
WA: Olympia	9	0.004	0.002	0.003
WA: Richland	7	0.008	0.005	0.006
WA: Seattle	5	0.003	0.001	0.002
WA: Spokane	9	0.009	0.004	0.007
WI: Madison	6	0.018	0.005	0.010
WI: Milwaukee	9	0.013	0.004	0.007
WI: Shawano	1	0.010	0.010	0.010
WV: Charleston	6	0.019	0.011	0.015

Table 4
Gross Beta in Airborne Particulates
September 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
AK: Anchorage	7	0.002	0.001	0.001
AK: Fairbanks	8	0.004	0.002	0.002
AK: Juneau	5	0.002	0.000	0.001
AL: Birmingham	8	0.012	0.006	0.009
AL: Montgomery/408	8	0.018	0.007	0.011
AR: Fort Smith	4	0.012	0.010	0.011
AR: Little Rock	8	0.021	0.007	0.010
AZ: Phoenix	7	0.022	0.011	0.017
AZ: Phoenix/956	6	0.019	0.006	0.012
AZ: Tucson	8	0.018	0.007	0.013
CA: Anaheim	8	0.016	0.007	0.012
CA: Bakersfield	5	0.020	0.012	0.016
CA: Eureka	3	0.006	0.002	0.003
CA: Fresno	5	0.015	0.008	0.010
CA: Los Angeles	4	0.015	0.007	0.012
CA: Richmond	4	0.010	0.004	0.007
CA: Riverside	8	0.012	0.006	0.009
CA: Sacramento	8	0.011	0.007	0.008
CA: San Bernardino Cty.	8	0.015	0.008	0.013
CA: San Diego	2	0.007	0.007	0.007
CA: San Francisco	8	0.005	0.003	0.004
CA: San Jose	8	0.009	0.005	0.007
CO: Colorado Springs	3	0.018	0.015	0.017
CO: Denver	8	0.022	0.010	0.015
CO: Grand Junction	5	0.020	0.010	0.017
CT: Hartford	8	0.007	0.003	0.005
DC: Washington	8	0.012	0.004	0.008
DE: Dover	4	0.008	0.004	0.005
FL: Jacksonville	8	0.008	0.003	0.006
FL: Miami	1	0.003	0.003	0.003
FL: Orlando	4	0.007	0.003	0.005
FL: Tallahassee	4	0.008	0.006	0.007
FL: Tampa	1	0.006	0.006	0.006
GA: Atlanta	4	0.011	0.006	0.008
GA: Augusta	5	0.015	0.008	0.011
HI: Hilo	8	0.003	0.001	0.002
HI: Honolulu	8	0.003	0.001	0.002
IA: Des Moines	6	0.013	0.006	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
IA: Mason City	5	0.007	0.004	0.005
IL: Aurora	7	0.013	0.006	0.009
IL: Champaign	2	0.010	0.006	0.008
IL: Chicago	7	0.009	0.005	0.007
IN: Fort Wayne	4	0.012	0.008	0.010
IN: Indianapolis	7	0.015	0.006	0.010
KS: Kansas City	5	0.008	0.005	0.007
KS: Topeka	8	0.016	0.003	0.010
KS: Wichita	7	0.010	0.006	0.009
KY: Lexington	7	0.013	0.005	0.009
KY: Louisville	5	0.013	0.007	0.009
LA: Baton Rouge	1	0.014	0.014	0.014
LA: Shreveport	8	0.014	0.005	0.008
MA: Boston	8	0.006	0.003	0.005
MA: Worcester	8	0.008	0.004	0.006
MD: Baltimore	8	0.014	0.007	0.010
ME: Orono	2	0.004	0.003	0.004
ME: Portland	8	0.006	0.003	0.005
MI: Bay City 48708	8	0.011	0.003	0.006
MI: Detroit	7	0.011	0.005	0.008
MI: Grand Rapids	4	0.013	0.005	0.008
MI: Lansing	8	0.024	0.010	0.018
MN: Duluth	4	0.004	0.002	0.003
MN: St. Paul	4	0.014	0.005	0.009
MO: Jefferson City	7	0.028	0.009	0.014
MO: Springfield	9	0.014	0.009	0.011
MO: St. Louis	4	0.010	0.007	0.008
MT: Billings	2	0.020	0.015	0.017
NC: Charlotte	8	0.010	0.005	0.008
NC: Raleigh	4	0.006	0.003	0.004
NC: Wilmington	4	0.009	0.005	0.008
ND: Bismarck	7	0.016	0.005	0.009
NE: Kearney	8	0.019	0.006	0.010
NE: Lincoln	8	0.014	0.008	0.010
NE: Omaha	4	0.017	0.008	0.011
NH: Concord	3	0.007	0.005	0.006
NJ: Edison	8	0.009	0.003	0.005
NM: Albuquerque	4	0.022	0.008	0.013

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2012

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NM: Carlsbad	7	0.021	0.013	0.018
NM: Navajo Lake St Park	4	0.022	0.011	0.014
NV: Las Vegas/913	8	0.014	0.006	0.009
NV: Reno	7	0.025	0.015	0.019
NY: Albany	7	0.011	0.006	0.008
NY: Lockport	8	0.010	0.004	0.007
NY: New York City	4	0.010	0.005	0.007
NY: Rochester	5	0.010	0.005	0.008
NY: Syracuse	2	0.008	0.005	0.007
NY: Yaphank	7	0.007	0.002	0.005
OH: Cincinnati	7	0.015	0.006	0.008
OH: Cleveland	3	0.010	0.006	0.008
OH: Painesville	8	0.013	0.005	0.009
OH: Toledo	7	0.008	0.004	0.006
OK: Oklahoma City	7	0.017	0.010	0.012
OK: Tulsa	8	0.014	0.008	0.011
OR: Corvallis	8	0.007	0.003	0.005
OR: Portland	8	0.007	0.003	0.004
PA: Philadelphia	4	0.009	0.006	0.007
PA: Pittsburgh	3	0.011	0.008	0.009
PR: San Juan	4	0.009	0.003	0.006
RI: Providence	4	0.006	0.003	0.005
SC: Columbia	4	0.012	0.006	0.009
SD: Pierre	8	0.021	0.006	0.011
SD: Rapid City	4	0.018	0.013	0.015
TN: Knoxville	5	0.018	0.008	0.014
TN: Memphis	4	0.011	0.007	0.008
TN: Nashville	7	0.014	0.005	0.009
TN: Oak Ridge/Bethel	6	0.021	0.008	0.012
TN: Oak Ridge/K25	6	0.021	0.007	0.013
TN: Oak Ridge/Melton	6	0.020	0.007	0.013
TN: Oak Ridge/Y12 E	6	0.021	0.007	0.012
TN: Oak Ridge/Y12 W	6	0.015	0.006	0.010
TX: Austin	4	0.019	0.009	0.013
TX: Dallas	9	0.022	0.007	0.011
TX: El Paso	6	0.029	0.020	0.024
TX: Ft. Worth	6	0.011	0.006	0.008
TX: Harlingen	7	0.009	0.006	0.007

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2012

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
TX: Houston	8	0.019	0.008	0.013
TX: Laredo	7	0.008	0.004	0.006
TX: Lubbock	8	0.017	0.008	0.011
TX: San Angelo	6	0.013	0.007	0.009
TX: San Antonio	8	0.013	0.006	0.009
UT: Salt Lake City	4	0.020	0.010	0.015
UT: St. George	2	0.022	0.014	0.018
VA: Harrisonburg	8	0.015	0.006	0.010
VA: Lynchburg	5	0.014	0.006	0.010
VA: Richmond	4	0.012	0.005	0.008
VA: Virginia Beach	6	0.009	0.005	0.007
VT: Burlington	8	0.007	0.003	0.005
WA: Olympia	7	0.008	0.002	0.004
WA: Richland	7	0.019	0.006	0.011
WA: Seattle	4	0.005	0.003	0.004
WA: Spokane	7	0.019	0.003	0.010
WI: Madison	8	0.014	0.004	0.008
WI: Milwaukee	7	0.009	0.003	0.006
WI: Shawano	8	0.012	0.004	0.007
WV: Charleston	5	0.015	0.010	0.011

Table 5
Specific Gamma in Precipitation
July 2012

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	Be-7	39	13
AZ: Phoenix		ND	
CO: Denver	Be-7	65	16
CT: Hartford	Be-7	43	23
FL: Jacksonville	Be-7	34	15
GA: Atlanta	Be-7	44	19
KS: Kansas City		ND	
MA: Boston	Be-7	84	21
MI: Lansing	Be-7	27	18
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	57	21
NC: Wilmington	Be-7	28	17
NY: Albany	Be-7	58	19
NY: Yaphank		ND	
OH: Painesville	Be-7	58	21
OR: Portland		ND	
PA: Harrisburg	Be-7	39	18
TN: Knoxville	Be-7	15	13
TN: Nashville	Be-7	35	17
TN: Oak Ridge/K25	Be-7	66	22
TN: Oak Ridge/Melton	Be-7	52	14
TN: Oak Ridge/Y12 E	Be-7	59	15
TX: Austin		ND	
UT: Salt Lake City		ND	
VA: Lynchburg	K-40	15	11
WA: Olympia	Be-7	70	19

Table 6
Specific Gamma in Precipitation
August 2012

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	Be-7	77	24
AR: Little Rock	Be-7	94	26
AZ: Phoenix		ND	
CO: Denver	Be-7	104	44
CT: Hartford	Be-7	49	21
FL: Jacksonville	Be-7	53	20
GA: Atlanta	Be-7	62	21
HI: Honolulu		ND	
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	76	23
MI: Lansing		ND	
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	46	20
NC: Wilmington	Be-7	45	18
NH: Concord	Be-7	41	17
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville		ND	
PA: Harrisburg	Be-7	41	19
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	61	24
TN: Oak Ridge/Melton	Be-7	70	23
TN: Oak Ridge/Y12 E	Be-7	66	20
TX: El Paso		ND	
VA: Lynchburg	K-40	16	12

Table 7
Specific Gamma in Precipitation
September 2012

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	Be-7	23	17
AR: Little Rock	Be-7	19	17
CO: Denver	Be-7	25	18
CT: Hartford		ND	
FL: Jacksonville	Be-7	40	17
GA: Atlanta	Be-7	40	18
	K-40	18	12
HI: Honolulu	Be-7	36	18
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	41	19
	K-40	19	12
MI: Lansing	Be-7	26	14
NC: Charlotte	Be-7	28	11
NC: Wilmington	K-40	12	12
NY: Albany	K-40	13	11
NY: Yaphank		ND	
OH: Painesville	Be-7	39	17
	K-40	14	12
PA: Harrisburg	Be-7	18	15
TN: Knoxville		ND	
TN: Nashville	Be-7	23	17
TN: Oak Ridge/K25	Be-7	20	16
TN: Oak Ridge/Melton	K-40	13	13
TN: Oak Ridge/Y12 E	Be-7	18	17
UT: Salt Lake City	Be-7	18	18
	K-40	17	12
VA: Lynchburg		ND	

Plutonium and Uranium in Airborne Particulates

Environmental radiation levels of plutonium and uranium are determined by the analysis of annually composited samples (air filters) collected from the airborne particulate samplers. Plutonium and uranium results are published in the ERD for the third quarter of the following year.

Concentrations of plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238 are determined by alpha-particle spectrometry following chemical separation. The volume of air represented by the annual composite typically ranges from 120,000 to 500,000 cubic meters.

Table 8
Plutonium and Uranium in Airborne Particulates
January–December 2011 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	0.9	1.1	0.36	0.78	6.4	2.7	1.2	1.5	5.0	2.4
AK: Fairbanks	−0.55	0.59	0.21	0.60	6.2	2.2	0.96	0.97	8.0	2.6
AK: Juneau	−0.05	0.22	0.07	0.20	2.38	0.82	0.36	0.36	1.53	0.65
AL: Birmingham	−0.3	1.2	−0.3	1.2	22.8	7.1	1.5	2.3	15.4	5.8
AL: Montgomery/408	−0.06	0.39	0.00	0.37	11.5	3.4	0.31	0.84	9.2	3.0
AR: Fort Smith	−0.7	1.1	0.00	0.89	20.7	6.2	6.1	3.6	15.8	5.4
AR: Little Rock	0.5	1.9	−0.51	0.95	17.5	5.0	2.2	2.0	17.0	4.9
AZ: Phoenix	2.5	2.5	0.5	1.3	49	13	6.3	4.9	56	14
AZ: Phoenix/956	2.6	3.1	0.4	1.7	67	17	7.6	6.2	40	13
AZ: Tucson	0.6	3.3	−0.6	2.0	43	13	4.0	4.6	40	13
AZ: Yuma	1.2	1.8	0.00	0.94	49	13	3.4	3.4	39	11
CA: Anaheim	−0.57	0.88	0.25	0.71	21.1	5.6	1.9	1.8	17.9	5.1
CA: Bakersfield	−0.5	1.8	1.3	2.9	61	16	1.9	3.4	76	19
CA: Eureka	0.33	0.85	0.13	0.59	6.3	2.6	0.6	1.0	6.0	2.6
CA: Fresno	0.2	1.5	−0.2	1.1	30.4	8.6	3.6	3.4	33.7	9.2
CA: Los Angeles	0.2	1.2	0.25	0.72	14.9	4.6	1.0	1.4	13.2	4.3
CA: Richmond	0.31	0.90	0.31	0.90	5.3	2.5	2.0	1.8	6.6	2.8
CA: Riverside	−1.0	1.6	−0.6	1.5	23.5	8.0	1.8	2.8	26.8	8.7
CA: Sacramento	−0.11	0.74	0.00	0.70	13.2	4.9	1.8	2.0	11.1	4.4
CA: San Bernardino Cty.	0.9	1.9	−0.1	1.4	42	11	6.3	4.6	36	11
CA: San Diego	0.3	1.2	0.00	0.86	21.9	6.7	0.7	1.8	23.7	7.1
CA: San Francisco	−0.1	1.0	−0.11	0.72	5.0	2.4	1.1	1.5	4.5	2.4
CA: San Jose	−0.12	0.82	−0.12	0.82	9.0	3.8	0.8	1.4	8.4	3.6
CO: Colorado Springs	1.2	1.7	0.56	0.98	27.9	7.4	5.1	3.2	27.9	7.4
CO: Denver	−0.15	0.89	0.52	0.93	25.7	6.6	5.5	3.1	20.6	5.8
CO: Grand Junction	0.00	0.87	0.18	0.83	34.6	8.4	1.5	1.9	35.4	8.5
CT: Hartford	0.00	0.80	0.51	0.90	7.7	3.2	2.7	2.1	8.0	3.3
DC: Washington	−0.26	0.34	−0.13	0.31	7.9	2.5	0.67	0.84	6.0	2.1
DE: Dover	0.28	0.49	0.03	0.32	5.0	1.9	0.35	0.61	4.4	1.7
FL: Jacksonville	−0.08	0.29	−0.04	0.28	9.1	2.6	1.01	0.91	8.4	2.5
FL: Miami	−0.16	0.54	−0.05	0.36	10.3	3.1	1.2	1.2	7.8	2.6
FL: Orlando	0.04	0.38	0.83	0.72	8.3	2.3	0.24	0.52	7.8	2.2
FL: Tallahassee	0.15	0.67	0.23	0.66	9.7	3.0	1.2	1.2	9.3	2.9
FL: Tampa	−0.29	0.54	0.07	0.66	42.2	8.4	2.5	1.8	35.8	7.5
GA: Atlanta	0.20	0.56	−0.05	0.34	13.3	3.5	1.3	1.2	16.7	4.1
GA: Augusta	0.15	0.67	0.00	0.71	14.9	4.2	1.7	1.6	10.6	3.4
HI: Hilo	0.13	0.59	0.13	0.59	2.4	1.4	0.36	0.78	1.9	1.3
HI: Honolulu	0.71	0.99	0.82	0.82	2.9	1.5	0.38	0.80	2.3	1.3
IA: Des Moines	0.43	0.92	0.00	0.80	16.7	6.2	3.7	3.3	21.2	7.1
IA: Mason City	−0.47	0.63	0.23	0.68	14.6	5.4	0.8	1.7	14.6	5.4

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2011 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*
ID: Idaho Falls	−0.11	0.74	0.7	1.2	19.4	6.4	3.4	3.0	23.4	7.1
IL: Aurora	0.9	1.2	−0.10	0.64	18.8	5.7	0.4	1.2	18.6	5.7
IL: Chicago	−0.9	1.9	0.6	1.6	18.8	6.5	4.9	3.7	16.8	6.1
IN: Fort Wayne	−0.26	0.48	−0.13	0.44	15.7	4.3	1.6	1.5	14.2	4.1
IN: Indianapolis	0.2	1.1	0.6	1.3	10.2	4.0	0.5	1.5	13.0	4.6
KS: Kansas City	0.0	1.0	−0.2	1.1	17.3	6.0	2.4	2.9	18.1	6.1
KS: Topeka	−0.24	0.82	0.16	0.73	14.2	5.5	1.6	2.2	16.0	6.0
KS: Wichita	0.7	1.3	0.0	1.1	24.8	7.9	1.8	2.4	31.9	9.1
KY: Lexington	−0.30	0.71	0.00	0.62	8.7	3.3	1.1	1.4	11.9	3.9
KY: Louisville	−0.18	0.86	0.44	0.95	10.5	3.5	2.9	2.0	10.5	3.5
LA: Baton Rouge	−0.26	0.49	0.13	0.58	11.2	3.9	1.0	1.3	11.9	4.0
LA: Shreveport	0.3	1.0	0.00	0.59	11.4	4.0	3.7	2.4	8.1	3.3
MA: Boston	0.17	0.75	0.17	0.75	5.6	2.1	0.27	0.74	5.8	2.2
MA: Worcester	−2.4	2.0	−0.2	1.4	32.3	9.4	3.0	3.5	24.5	8.0
MD: Baltimore	0.19	0.84	−0.09	0.62	7.0	3.0	0.6	1.2	7.7	3.2
ME: Orono	−0.16	0.54	0.00	0.49	7.1	2.7	0.42	0.92	4.9	2.2
ME: Portland	−0.2	1.7	−0.5	1.3	31.2	8.9	4.6	3.6	30.2	8.6
MI: Bay City 48708	0.15	0.56	0.15	0.44	8.0	3.4	0.4	1.3	7.3	3.3
MI: Detroit	−0.19	0.46	0.06	0.58	11.9	3.6	1.7	1.5	10.6	3.4
MI: Grand Rapids	−0.09	0.31	−0.04	0.30	5.3	1.9	0.22	0.61	5.0	1.9
MI: Lansing	−0.3	1.0	−0.3	1.0	13.8	5.1	1.9	2.2	9.4	4.2
MN: Duluth	−0.06	0.21	−0.03	0.20	2.86	0.93	0.27	0.34	3.3	1.0
MN: St. Paul	−0.08	0.52	0.00	0.50	11.4	3.6	0.55	0.97	14.0	4.1
MN: Welch/510	−0.33	0.62	0.25	0.72	4.1	2.0	0.52	0.92	5.6	2.4
MO: Jefferson City	0.00	0.52	−0.17	0.40	6.6	2.5	2.3	1.6	10.4	3.2
MO: Springfield	0.06	0.54	0.29	0.63	10.7	3.7	1.4	1.5	9.4	3.4
MO: St. Louis	−0.11	0.75	0.2	1.0	17.6	5.1	3.1	2.3	9.9	3.7
MS: Jackson/Deq	0.0	1.4	0.2	1.1	10.7	4.0	2.5	2.2	13.3	4.5
MT: Billings	−0.4	1.7	0.1	1.2	32.1	9.1	5.3	3.9	33.8	9.5
NC: Charlotte	0.26	0.55	−0.05	0.34	10.6	3.2	1.9	1.5	9.6	3.0
NC: Raleigh	0.13	0.60	0.00	0.42	8.9	2.9	2.0	1.5	10.1	3.1
NC: Wilmington	−0.10	0.24	0.07	0.29	8.6	2.4	1.4	1.1	5.5	1.9
ND: Bismarck	0.16	0.88	0.16	0.70	17.0	5.6	1.6	2.0	14.8	5.2
NE: Kearney	0.8	1.3	2.2	1.6	20.3	6.3	4.0	3.0	19.5	6.1
NE: Lincoln	−0.48	0.74	0.19	0.85	22.3	7.2	−0.2	1.7	17.1	6.1
NE: Omaha	−0.08	0.74	0.00	0.49	19.2	5.6	1.7	1.9	18.7	5.5
NH: Concord	0.23	0.64	0.00	0.37	7.4	2.4	0.94	0.94	7.4	2.4
NJ: Edison	−0.26	0.64	0.26	0.77	5.2	2.4	1.1	1.3	7.2	2.8
NJ: Trenton	−0.36	0.86	0.00	0.75	11.7	4.4	1.6	2.0	13.3	4.8
NM: Albuquerque	−0.50	0.78	0.4	1.1	22.2	6.9	2.2	2.6	28.5	8.1

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2011 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: Carlsbad	0.9	3.9	−0.4	2.9	45	16	5.8	6.6	41	15
NM: Navajo Lake St	−0.08	0.55	0.00	0.53	10.0	3.5	1.2	1.5	15.8	4.6
Park	−0.4	1.7	0.0	1.1	22.5	7.3	1.6	2.4	27.3	8.2
NM: Santa Fe	0.0	1.8	0.6	1.7	33.3	9.6	2.6	3.0	27.3	8.5
NV: Las Vegas/913	1.1	3.2	−0.2	1.5	27.2	8.4	3.5	3.7	28.4	8.6
NV: Reno	−0.5	1.2	0.0	1.5	15.2	5.9	3.1	3.2	9.8	4.7
NY: Albany	−0.09	0.58	0.00	0.55	8.6	3.2	2.4	1.9	5.8	2.6
NY: Hauppauge	−0.41	0.77	0.00	0.65	5.7	2.6	0.7	1.2	7.0	2.8
NY: Lockport	−0.20	0.70	0.00	0.64	10.6	4.1	1.1	1.6	9.4	3.8
NY: New York City	−0.27	0.65	−0.27	0.65	9.1	3.5	4.3	2.7	7.0	3.1
NY: Rochester	0.12	0.70	−0.19	0.45	8.9	3.0	1.4	1.3	5.9	2.4
NY: Syracuse	−0.07	0.49	−0.15	0.51	5.5	2.2	1.6	1.3	4.4	2.0
NY: Yaphank	−0.10	0.67	0.30	0.89	10.4	3.6	0.9	1.3	7.0	2.9
OH: Cincinnati	0.49	0.96	0.18	0.53	9.1	3.4	−0.10	0.95	9.2	3.3
OH: Cleveland	−0.12	0.77	0.00	0.73	15.0	5.1	2.0	2.2	13.1	4.8
OH: Columbus	−0.28	0.33	0.00	0.37	11.5	3.1	1.2	1.0	8.1	2.5
OH: Painesville	−0.53	0.63	−0.15	0.52	11.2	3.4	1.9	1.5	12.3	3.6
OH: Toledo	−0.5	1.7	0.0	1.5	18.3	7.6	4.1	4.1	25.1	9.0
OK: Oklahoma City	1.4	1.3	0.07	0.66	23.5	6.2	2.2	2.1	16.1	5.0
OK: Tulsa	0.5	1.1	0.30	0.78	3.9	1.5	0.90	0.89	3.8	1.5
OR: Corvallis	0.48	0.75	0.12	0.54	6.3	2.1	1.6	1.2	6.4	2.1
OR: Portland	0.00	0.72	0.00	0.49	2.9	1.4	0.72	0.83	4.2	1.7
PA: Harrisburg	−0.36	0.38	0.09	0.40	8.1	2.2	1.4	1.0	6.6	2.0
PA: Philadelphia	−0.14	0.33	0.00	0.29	7.3	2.2	1.4	1.1	9.8	2.6
PA: Pittsburgh	−0.3	1.2	0.5	1.5	18.0	7.0	2.9	3.4	16.5	6.5
PR: San Juan	−0.9	1.1	−0.19	0.66	8.1	3.2	1.2	1.4	12.8	4.0
RI: Providence	0.26	0.67	−0.10	0.36	7.6	2.2	0.57	0.71	6.9	2.1
SC: Barnwell	0.11	0.31	0.11	0.31	13.9	3.4	1.5	1.1	16.0	3.7
SC: Columbia	−0.36	0.68	−0.09	0.60	18.0	7.2	2.1	2.9	20.0	7.6
SD: Pierre	1.4	2.0	0.8	1.4	25.8	7.5	2.7	2.8	21.6	6.8
SD: Rapid City	0.00	0.36	0.15	0.42	8.2	2.5	3.0	1.6	7.8	2.4
TN: Knoxville	−0.3	1.4	−0.14	0.94	18.2	5.8	1.7	2.1	13.6	4.9
TN: Memphis	0.05	0.58	0.05	0.46	9.2	2.7	2.3	1.4	9.7	2.8
TN: Nashville	−0.24	0.59	0.00	0.52	29.8	6.2	2.1	1.6	7.1	2.6
TN: Oak Ridge/Bethel	−0.07	0.43	0.33	0.70	58.6	9.6	4.7	2.0	13.8	3.4
TN: Oak Ridge/K25	−0.07	0.45	0.20	0.59	6.2	2.1	1.9	1.3	5.4	2.0
TN: Oak Ridge/Melton	−0.3	1.0	−0.10	0.67	29.6	6.5	4.1	2.4	9.3	3.2
TN: Oak Ridge/Y12 E	−0.68	0.73	0.00	0.54	93	15	5.6	2.7	15.6	4.2
TN: Oak Ridge/Y12 W	0.3	4.0	0.7	3.1	36	12	3.4	4.3	31	11
TX: Amarillo	0.4	1.6	0.4	1.3	13.4	5.1	3.6	2.9	14.1	5.1
TX: Austin										

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2011 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: Corpus Christi	−0.1	1.0	0.21	0.94	17.4	6.3	3.3	3.2	20.3	6.8
TX: Dallas	−0.9	1.3	0.3	1.5	14.3	5.6	0.2	1.7	17.8	6.2
TX: El Paso	−3.0	4.7	1.8	5.2	51	19	14	11	82	24
TX: Ft. Worth	0.5	2.3	0.0	1.6	21.2	8.3	1.6	2.9	27.7	9.5
TX: Harlingen	0.0	1.7	0.8	2.3	28.7	9.8	2.7	3.8	17.7	7.5
TX: Houston	0.00	0.76	−0.48	0.90	10.3	3.9	1.0	1.5	9.5	3.7
TX: Laredo	−0.4	2.3	−0.2	1.8	15.0	5.9	1.9	2.7	12.7	5.4
TX: Lubbock	5	11	4.6	8.1	78	29	4.3	9.3	67	26
TX: San Angelo	−1.1	2.6	−1.4	2.7	29	11	0.3	3.1	32	11
TX: San Antonio	1.7	2.3	0.6	1.6	14.3	6.0	6.4	4.6	15.6	6.4
UT: Salt Lake City	−0.1	1.3	0.5	1.5	31.5	9.1	4.2	3.5	30.7	8.9
VA: Harrisonburg	−0.08	0.27	−0.08	0.27	4.7	1.6	0.65	0.65	4.4	1.5
VA: Lynchburg	−0.25	0.39	0.07	0.32	11.5	2.7	1.59	0.99	5.8	1.8
VA: Richmond	0.09	0.27	0.06	0.28	8.1	2.2	1.24	0.89	7.0	2.0
VA: Virginia Beach	0.08	0.35	−0.04	0.26	8.5	2.5	0.38	0.69	7.4	2.3
VT: Burlington	0.1	1.5	0.00	0.58	9.4	3.4	1.0	1.4	5.4	2.5
WA: Olympia	−0.08	0.26	−0.05	0.18	2.5	1.1	0.08	0.37	2.7	1.1
WA: Richland	0.9	1.5	−0.21	0.72	25.7	7.4	1.0	2.0	17.0	5.8
WA: Seattle	−0.02	0.19	−0.06	0.14	2.42	0.87	0.71	0.52	2.29	0.85
WA: Spokane	−1.4	1.4	0.3	1.5	15.2	5.7	1.6	2.2	7.2	3.8
WI: Madison	−0.2	1.1	−0.5	1.2	12.5	5.1	2.3	2.7	10.0	4.5
WI: Milwaukee	−0.11	0.40	−0.06	0.38	5.7	2.1	0.39	0.69	5.5	2.0
WV: Charleston	−0.04	0.37	0.00	0.25	7.3	2.3	0.58	0.81	9.4	2.7

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 2012

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	08/16/12	−14	79
AL: Dothan	07/05/12	15	88
AL: Muscle Shoals	07/12/12	21	88
AL: Scottsboro	07/11/12	57	85
AR: Little Rock	07/03/12	−56	76
CA: Los Angeles	08/14/12	−18	78
CA: Richmond	07/02/12	53	89
CO: Denver	07/16/12	31	83
CT: Hartford	07/03/12	48	90
DE: Dover	07/05/12	−82	76
FL: Tampa	07/02/12	−35	77
GA: Baxley	08/02/12	46	82
GA: Savannah	07/20/12	46	85
HI: Honolulu	09/07/12	−85	76
IA: Cedar Rapids	08/01/12	−53	78
ID: Boise	07/06/12	−48	77
ID: Idaho Falls	07/05/12	−26	77
IL: W. Chicago	07/09/12	54	85
KS: Topeka	07/05/12	−8	87
LA: New Orleans	07/23/12	23	84
MD: Baltimore	07/09/12	−29	87
MD: Conowingo	08/07/12	19	81
MI: Detroit	07/23/12	49	84
MI: Detroit	08/28/12	56	82
MN: St. Paul	07/11/12	75	86
MN: Welch	07/11/12	6	83
MO: Jefferson City	07/02/12	−19	77
MS: Jackson	07/03/12	−5	78
MS: Port Gibson	07/05/12	−15	87
MT: Helena	07/12/12	−17	86
NC: Charlotte	07/10/12	380	100
ND: Bismarck	07/03/12	21	89
NE: Lincoln	07/05/12	27	88
NJ: Trenton	09/04/12	−19	79
NJ: Waretown	09/04/12	−7	79
NY: Albany	09/28/12	−17	87
NY: New York City	07/10/12	59	85
NY: Syracuse	08/10/12	32	81
OH: Cincinnati	07/09/12	−23	86
OH: Columbus	07/10/12	6	88

Table 9 (continued)
Tritium in Drinking Water
July–September 2012

Location	Date Collected	^{3}H pCi/L	± 2*u*
OH: E. Liverpool	08/22/12	−16	79
OH: Painesville	07/19/12	144	89
OH: Toledo	07/19/12	126	88
OR: Portland	09/28/12	300	100
PA: Columbia	08/01/12	12	81
PA: Harrisburg	07/31/12	11	80
PA: Philadelphia/Baxter	07/18/12	69	85
PA: Philadelphia/Belmont	07/18/12	36	84
PA: Philadelphia/Queen	07/18/12	56	85
PA: Pittsburgh	08/21/12	14	81
RI: Providence	07/03/12	15	88
SC: Barnwell	07/30/12	51	84
SC: Columbia	07/31/12	51	84
SC: Jenkinsville	07/11/12	−2	80
SC: Seneca	07/09/12	11	82
TN: Knoxville	07/03/12	88	91
TN: Oak Ridge/#360	07/10/12	92	86
TN: Oak Ridge/#371	07/10/12	390	100
TN: Oak Ridge/#4442	07/10/12	57	85
TN: Oak Ridge/#768	07/10/12	−46	85
TN: Oak Ridge/#772	07/10/12	48	90
TX: Austin	07/09/12	34	88
VA: Lynchburg	07/09/12	8	87
WA: Richland	08/15/12	−27	79
WI: Madison	07/05/12	−39	77

Table 10
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January–December 2011

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*
IL: Morris	−0.010 0.033	0.014 0.053	0.63 0.27	0.05 0.11	0.11 0.14
IL: W. Chicago	−0.004 0.042	0.061 0.066	0.11 0.12	0.017 0.098	0.000 0.046
LA: New Orleans	0.025 0.044	0.008 0.037	0.50 0.22	−0.009 0.060	0.54 0.23
MD: Conowingo	0.009 0.039	0.022 0.047	4.25 0.66	0.11 0.11	2.23 0.44
MN: Welch	0.000 0.040	0.021 0.045	0.073 0.092	0.000 0.051	0.047 0.084
NE: Lincoln	−0.005 0.031	0.014 0.040	4.46 0.72	0.23 0.16	3.29 0.59
NH: Concord	0.050 0.070	0.137 0.087	0.034 0.073	−0.008 0.078	0.068 0.095
NV: Las Vegas	0.019 0.051	0.047 0.065	2.35 0.55	0.15 0.15	1.37 0.41
SC: Jenkinsville	−0.009 0.030	−0.009 0.030	1.32 0.33	0.000 0.046	0.75 0.25
WI: Madison	0.040 0.063	0.036 0.055	0.74 0.27	0.07 0.11	0.21 0.15

Note: NA = No Analysis

Table 11
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2011

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	79.2	3.9 1.8	0.2 1.9	
AL: Dothan	29.5	3.0 2.8	1.1 3.4	
AL: Montgomery	16.9	2.0 1.4	−0.2 1.4	
AL: Muscle Shoals	35.2	2.3 1.6	0.8 1.7	
AL: Scottsboro	16.7	2.1 2.9	−0.4 2.8	
AR: Little Rock	12.8	1.9 1.5	0.1 1.4	0.28 0.30
CA: Los Angeles	56.4	4.0 3.1	1.6 3.8	−0.73 0.72
CA: Richmond	25.7	0.4 1.4	0.8 1.8	0.25 0.46
CO: Denver	27.3	2.3 2.8	1.2 3.4	−0.29 0.40
CT: Hartford	18.0	0.7 1.1	1.5 1.4	
DE: Dover	59.3	3.6 3.2	−0.8 3.5	
FL: Tampa	40.6	1.7 2.7	0.8 3.6	
GA: Baxley	61.2	2.1 1.6	1.8 2.1	
GA: Savannah	53.4	0.7 1.5	0.4 1.8	
HI: Honolulu	48.6	2.1 3.1	1.3 3.7	
IA: Cedar Rapids	58.3	3.6 1.7	0.2 1.8	−0.19 0.30
ID: Boise	26.9	1.3 1.4	0.4 1.7	
ID: Idaho Falls	56.8	5.5 3.4	1.0 3.7	
IL: Morris	45.0	12.8 6.8	10.6 8.8	
IL: W. Chicago	39.3	8.5 3.5	2.3 3.7	
KS: Topeka	61.9	11.5 3.9	0.6 3.7	0.10 0.69
LA: New Orleans	48.2	5.0 3.2	2.2 4.0	0.02 0.26
MD: Baltimore	29.4	1.6 2.8	0.9 3.3	
MD: Conowingo	52.0	6.8 2.0	3.6 2.5	
MI: Grand Rapids	16.9	3.0 5.5	0.9 6.1	
MN: St. Paul	51.3	2.1 1.6	0.5 1.8	
MN: Welch	116.7	8.1 2.3	6.5 3.2	
MO: Jefferson City	86.2	6.2 2.0	0.7 2.1	0.17 0.38
MS: Jackson	22.7	2.9 1.5	0.8 1.7	
MS: Port Gibson	56.4	5.2 3.3	1.4 3.7	
MT: Helena	40.8	1.6 1.6	0.8 1.8	0.12 0.35
NC: Raleigh	44.9	3.5 1.7	0.4 1.8	
ND: Bismarck	89.3	4.9 1.8	0.2 2.0	0.04 0.36
NE: Lincoln	61.1	12.5 4.1	8.6 5.2	0.00 0.32
NH: Concord	31.3	2.4 1.6	2.0 2.0	
NJ: Trenton	103.5	2.00 0.77	0.36 0.89	
NJ: Waretown	34.1	2.4 1.1	0.3 1.2	

Table 11 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2011

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	62.6	4.7 1.9	0.8 2.0	0.0 1.0
NV: Las Vegas	40.7	4.1 5.6	5.6 7.9	
NY: Albany	73.8	1.40 0.70	0.33 0.79	
NY: New York City	20.5	1.5 1.5	−0.2 1.5	
NY: Niagara Falls	52.0	1.9 1.6	0.2 1.8	
NY: Syracuse	28.9	−1.1 2.6	1.2 3.5	
OH: Cincinnati	68.4	3.6 1.7	1.3 2.1	−0.20 0.44
OH: Columbus	86.3	5.2 1.9	0.7 2.0	0.04 0.28
OH: E. Liverpool	71.5	2.8 1.7	0.5 1.9	0.23 0.62
OH: Painesville	62.3	2.6 1.6	−0.1 1.9	0.57 0.45
OH: Toledo	40.5	3.3 1.7	1.2 1.9	0.46 0.31
OK: Oklahoma City	27.9	4.1 3.1	0.5 3.2	−0.5 1.0
OR: Portland	10.0	0.3 1.3	−0.2 1.3	
PA: Columbia	68.2	2.0 1.7	−0.1 1.9	
PA: Harrisburg	74.3	1.6 1.6	−0.5 1.7	
PA: Philadelphia/Baxter	31.7	1.4 2.8	−0.6 3.3	
PA: Philadelphia/Belmont	48.1	2.9 3.1	−0.8 3.4	
PA: Philadelphia/Queen	54.0	3.9 3.1	0.3 3.5	
PA: Pittsburgh	86.1	2.1 1.3	0.1 1.6	
RI: Providence	34.6	1.8 1.2	0.5 1.4	
SC: Barnwell	33.4	2.6 1.5	0.8 1.8	
SC: Columbia	25.0	2.9 1.6	0.9 1.7	
SC: Jenkinsville	24.7	2.7 1.6	2.4 2.0	
SC: Seneca	7.9	1.0 1.3	0.3 1.4	
TN: Knoxville	44.2	1.9 1.5	0.3 1.7	
TN: Oak Ridge/#360	35.5	3.0 1.7	0.6 1.7	0.31 0.90
TN: Oak Ridge/#371	52.6	1.6 1.5	0.4 1.9	0.25 0.35
TN: Oak Ridge/#4442	24.4	2.7 2.9	0.1 3.0	0.16 0.39
TN: Oak Ridge/#768	26.8	−0.3 2.8	0.9 3.3	−0.20 0.37
TN: Oak Ridge/#772	27.1	2.5 2.7	0.2 3.2	−0.02 0.37
TX: Austin	61.4	3.5 1.7	1.1 2.1	0.04 0.32
VA: Ashland	45.6	3.2 1.2	0.3 1.2	
VA: Lynchburg	9.6	−0.4 2.6	−0.2 2.5	
WA: Richland	32.7	1.8 1.5	0.6 1.7	
WI: Madison	36.5	1.1 5.6	2.2 6.9	0.27 0.31

Table 12
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
AK: Fairbanks	NA	NA	Co-60	−0.42 0.96
			Cs-137	0 19
			K-40	8 13
			Ra-228	3.1 3.8
AL: Dothan	NA	NA	Co-60	−0.5 4.7
			Cs-137	0.16 0.66
			K-40	5.1 8.7
			Ra-228	−0.8 4.1
AL: Montgomery	NA	NA	Co-60	0.35 0.89
			Cs-137	−0.1 2.1
			K-40	−7 12
			Ra-228	−0.3 3.5
AL: Muscle Shoals	NA	NA	Co-60	0.41 0.61
			Cs-137	−0.20 0.61
			K-40	−2 14
			Ra-228	0.5 2.4
AL: Scottsboro	NA	NA	Co-60	−0.7 1.8
			Cs-137	−0.1 2.9
			K-40	−10 16
AR: Little Rock	NA	NA	Co-60	0.11 0.76
			Cs-137	0.17 0.86
			K-40	2 11
			Ra-228	4.2 4.6
CA: Los Angeles	NA	NA	Co-60	−0.4 2.4
			Cs-137	−0.1 9.8
			K-40	−6 13
CA: Richmond	NA	NA	Co-60	0 26
			Cs-137	−0.3 2.3
			K-40	−8 15
			Ra-228	−1.0 4.8
CO: Denver	NA	NA	Co-60	−0.1 1.5
			Cs-137	0.03 0.89
			K-40	0 13
			Ra-228	2.3 4.9
CT: Hartford	NA	NA	Co-60	0.64 0.89

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
CT: Hartford	NA	NA	Cs-137	−0.06 0.90
			K-40	−1 13
			Ra-228	−0.5 4.3
DE: Dover	NA	NA	Co-60	0.20 0.61
			Cs-137	0.03 0.61
			Ra-228	1.0 2.4
FL: Tampa	NA	NA	Co-60	0.28 0.72
			Cs-137	−0.5 1.3
			K-40	10 12
			Ra-228	−0.8 4.0
GA: Baxley	NA	NA	Co-60	0.16 0.84
			Cs-137	0.57 0.92
			K-40	−1 11
			Ra-228	−0.1 3.7
GA: Savannah	NA	NA	Co-60	−0.4 2.9
			Cs-137	−0.1 7.5
			K-40	8 11
			Ra-228	−1.3 5.0
HI: Honolulu	NA	NA	Co-60	0.68 0.84
			Cs-137	0 48
			K-40	−10 16
			Ra-228	−1.1 4.7
IA: Cedar Rapids	NA	NA	Co-60	−0.2 8.5
			Cs-137	−0.1 5.2
			K-40	3 12
			Ra-228	−1.3 5.2
ID: Boise	NA	NA	Co-60	0.00 0.64
			Cs-137	0.01 0.60
			K-40	−0.5 7.8
			Ra-228	1.2 2.4
ID: Idaho Falls	NA	NA	Co-60	−0.3 3.7
			Cs-137	0.28 0.82
			K-40	5 11
			Ra-228	−3.2 9.7
IL: Morris	1.85 0.36	NA	Co-60	0.02 0.75

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
IL: Morris	1.85 0.36	NA	Cs-137	0.22 0.92
			K-40	−1 12
			Ra-228	2.4 3.9
IL: W. Chicago	0.53 0.19	NA	Co-60	−0.2 8.5
			Cs-137	0.43 0.97
			K-40	5 12
			Ra-228	−2.4 6.2
KS: Topeka	NA	NA	Co-60	0.28 0.77
			Cs-137	0 26
			K-40	4 11
			Ra-228	3.7 4.5
LA: New Orleans	0.099 0.086	NA	Co-60	−0.1 1.5
			Cs-137	0 14
			K-40	7 12
			Ra-228	−2.7 8.3
MD: Baltimore	NA	NA	Co-60	−0.3 6.3
			Cs-137	−0.2 2.7
			K-40	8 11
			Ra-228	−0.1 3.6
MD: Conowingo	0.33 0.15	NA	Co-60	−0.4 2.6
			Cs-137	−0.7 1.4
			K-40	6.8 9.7
			Ra-228	2.5 4.4
MI: Grand Rapids	NA	NA	Co-60	0 20
			Cs-137	0 18
			K-40	9 10
			Ra-228	−2.0 6.1
MN: St. Paul	NA	NA	Co-60	−1 29
			Cs-137	0.01 0.63
			K-40	5.2 7.6
			Ra-228	1.7 4.2
MN: Welch	1.45 0.32	NA	Co-60	0.30 0.83
			Cs-137	0 25
			K-40	14 12
MO: Jefferson City	NA	NA	Co-60	−0.5 2.2

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
MO: Jefferson City	NA	NA	Cs-137	0.32 0.90
			K-40	−5 12
			Ra-228	−1.6 5.6
MS: Jackson	NA	NA	Co-60	0.07 0.63
			Cs-137	−0.08 0.62
			K-40	2.6 5.6
			Ra-228	1.1 2.4
MS: Port Gibson	NA	NA	Co-60	−0.31 0.84
			Cs-137	0.22 0.84
			K-40	7 11
			Ra-228	−1.2 4.9
MT: Helena	NA	NA	Co-60	−0.03 0.90
			Cs-137	−0.1 9.0
			K-40	7 12
			Ra-228	4.4 3.7
NC: Raleigh	NA	NA	Co-60	−0.15 0.99
			Cs-137	0.16 0.63
			K-40	5.1 9.3
			Ra-228	1.1 4.0
ND: Bismarck	NA	NA	Co-60	−0.3 6.1
			Cs-137	0.53 0.91
			K-40	8 11
			Ra-228	0.2 3.3
NE: Lincoln	0.15 0.11	NA	Co-60	0 18
			Cs-137	−0.3 1.8
			K-40	10 11
			Ra-228	1.9 4.3
NH: Concord	0.035 0.063	NA	Co-60	0.00 0.50
			Cs-137	−0.12 0.94
			K-40	−17 21
			Ra-228	1.7 4.0
NJ: Trenton	NA	NA	Co-60	0.00 0.66
			Cs-137	0.10 0.64
			K-40	−1.3 9.5
			Ra-228	0.3 4.1

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
NJ: Waretown	NA	NA	Co-60	0.00 0.64
			Cs-137	−0.02 0.67
			Ra-228	2.2 2.5
NM: Santa Fe	NA	NA	Co-60	−0.5 2.0
			Cs-137	0.12 0.97
			K-40	9.9 9.9
			Ra-228	1.8 3.5
NV: Las Vegas	0.17 0.11	NA	Co-60	0 57
			Cs-137	−0.2 2.6
			K-40	8 12
			Ra-228	−2.9 7.5
NY: Albany	NA	NA	Co-60	0.19 0.76
			Cs-137	0.66 0.79
			K-40	−1 12
			Ra-228	−1.3 4.9
NY: New York City	NA	NA	Co-60	0.00 0.73
			Cs-137	−0.02 0.65
			K-40	3 11
			Ra-228	−2.3 6.9
NY: Niagara Falls	NA	NA	Co-60	−0.11 0.76
			Cs-137	0.00 0.95
			K-40	0 12
			Ra-228	2.5 3.8
NY: Syracuse	NA	NA	Co-60	−0.2 4.4
			Cs-137	0.11 0.55
			K-40	4 10
			Ra-228	0.5 3.5
OH: Cincinnati	NA	NA	Co-60	−0.1 3.4
			Cs-137	−0.5 1.5
			K-40	6 12
			Ra-228	0.0 3.3
OH: Columbus	NA	NA	Co-60	0.37 0.80
			Cs-137	0.12 0.98
			K-40	−7 15
			Ra-228	0.0 3.1

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2*u*
OH: E. Liverpool	NA	NA	Co-60	−0.02 0.81
			Cs-137	0 12
			K-40	−11 14
			Ra-228	1.7 3.9
OH: Painesville	NA	NA	Co-60	−0.1 1.4
			Cs-137	−0.1 8.6
			K-40	0 13
			Ra-228	1.3 4.1
OH: Toledo	NA	NA	Co-60	0 22
			Cs-137	−0.01 0.99
			K-40	5 14
			Ra-228	−0.8 3.9
OK: Oklahoma City	NA	NA	Co-60	−0.5 1.2
			Cs-137	0.2 1.4
			K-40	5 19
			Ra-228	0.8 5.9
OR: Portland	NA	NA	Co-60	0.32 0.78
			Cs-137	−0.5 1.4
			K-40	15 12
			Ra-228	−2.2 6.5
PA: Columbia	NA	NA	Co-60	−0.3 3.8
			Cs-137	0.00 0.70
			K-40	0 12
			Ra-228	1.3 4.2
PA: Harrisburg	NA	NA	Co-60	−0.1 1.6
			Cs-137	−0.3 2.1
			K-40	−1 13
			Ra-228	−1.0 4.5
PA: Philadelphia/Baxter	NA	NA	Co-60	0.10 0.72
			Cs-137	0.10 0.87
			K-40	−10 15
			Ra-228	0.8 3.5
PA: Philadelphia/Belmont	NA	NA	Co-60	0.39 0.76
			Cs-137	−0.3 1.8
			K-40	0.4 9.8

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
PA: Philadelphia/Belmont	NA	NA	Ra-228	3.0 3.5
PA: Philadelphia/Queen	NA	NA	Co-60	0.51 0.77
			Cs-137	0.31 0.86
			K-40	5 12
			Ra-228	−1.1 4.7
PA: Pittsburgh	NA	NA	Co-60	0 12
			Cs-137	−0.6 1.3
			K-40	−14 19
			Ra-228	−0.8 4.5
RI: Providence	NA	NA	Co-60	0.89 0.76
			Cs-137	0.74 0.93
			K-40	−16 20
			Ra-228	−2.2 6.3
SC: Barnwell	NA	NA	Co-60	0.21 0.85
			Cs-137	−0.1 4.1
			K-40	6 14
			Ra-228	0.7 3.8
SC: Columbia	NA	NA	Co-60	−0.2 8.5
			Cs-137	−0.2 2.9
			K-40	2 11
			Ra-228	−1.0 4.4
SC: Jenkinsville	0.18 0.11	NA	Co-60	−0.2 8.5
			Cs-137	0.39 0.89
			K-40	−12 18
			Ra-228	3.5 4.7
SC: Seneca	NA	NA	Co-60	−0.3 3.5
			Cs-137	0.52 0.92
			K-40	7 11
			Ra-228	1.8 4.2
TN: Knoxville	NA	NA	Co-60	0 12
			Cs-137	0.59 0.89
			K-40	5 12
			Ra-228	0.3 3.6
TN: Oak Ridge/#360	NA	NA	Co-60	0.09 0.77
			Cs-137	−0.2 2.5

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
TN: Oak Ridge/#360	NA	NA	K-40	3 13
			Ra-228	0.1 4.1
TN: Oak Ridge/#371	NA	NA	Co-60	0.52 0.68
			Cs-137	0.23 0.87
			K-40	6 11
			Ra-228	−1.7 6.0
TN: Oak Ridge/#4442	NA	NA	Co-60	−0.7 1.6
			Cs-137	−0.1 4.1
			K-40	14 12
			Ra-228	−2.6 8.0
TN: Oak Ridge/#768	NA	NA	Co-60	0.00 0.85
			Cs-137	0.03 0.84
			K-40	4 12
			Ra-228	−1.1 4.9
TN: Oak Ridge/#772	NA	NA	Co-60	0.0 1.1
			Cs-137	−0.4 1.7
			K-40	7 12
TX: Austin	NA	NA	Co-60	−0.1 2.0
			Cs-137	−0.5 1.5
			K-40	3 10
			Ra-228	1.9 4.3
VA: Ashland	NA	NA	Co-60	−0.5 5.1
			Cs-137	−0.08 0.75
			K-40	10.5 9.3
			Ra-228	1.4 3.9
VA: Lynchburg	NA	NA	Co-60	0.47 0.63
			Cs-137	0.12 0.62
			K-40	1.7 5.6
			Ra-228	1.4 2.4
WA: Richland	NA	NA	Co-60	0.33 0.87
			Cs-137	−0.4 1.5
			K-40	6 13
			Ra-228	−0.7 4.2

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2011

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2*u*
WI: Madison	1.34 0.31	NA	Co-60	−0.2 7.9
			Cs-137	0.33 0.91
			K-40	−1 13
			Ra-228	2.2 3.5

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 2012

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: Fayetteville	08/08/12	1.55 0.19	ND	NR	NR
CA: Los Angeles	09/24/12	1.74 0.20	ND	ND	ND
CA: San Francisco	07/11/12	1.70 0.21	ND	ND	ND
CT: Hartford	08/27/12	1.65 0.19	ND	ND	NR
DE: Wilmington	07/16/12	1.75 0.20	ND	ND	ND
HI: Hilo	07/11/12	1.81 0.21	ND	ND	ND
IA: Des Moines	07/16/12	1.64 0.19	ND	ND	ND
KS: Wichita	07/31/12	1.67 0.19	ND	NR	NR
KY: Louisville	07/09/12	1.66 0.19	ND	ND	ND
MA: Boston	09/19/12	1.59 0.20	ND	ND	ND
MD: Baltimore	07/11/12	1.73 0.20	ND	ND	ND
MI: Detroit	07/17/12	1.79 0.20	ND	ND	ND
NJ: Trenton	07/19/12	1.70 0.19	ND	ND	ND
NV: Las Vegas	09/24/12	1.67 0.20	ND	ND	ND
NY: Buffalo	09/09/12	1.68 0.20	ND	ND	ND
NY: Syracuse	07/09/12	1.74 0.20	ND	ND	ND
OH: Cincinnati	07/17/12	1.58 0.19	ND	ND	ND
OH: Cleveland	07/09/12	1.74 0.20	ND	ND	ND
OR: Portland	07/23/12	1.63 0.20	ND	ND	ND
PA: Pittsburgh	07/16/12	1.61 0.19	ND	ND	ND
TN: Knoxville	07/10/12	1.70 0.20	ND	ND	ND
TN: Memphis	07/16/12	1.51 0.18	ND	ND	ND
TX: Dallas	08/14/12	1.63 0.19	ND	NR	NR
TX: San Antonio	07/17/12	1.56 0.18	ND	ND	ND
VT: Montpelier	07/26/12	1.65 0.20	ND	ND	ND
WA: Spokane	07/13/12	1.65 0.19	ND	ND	ND
WA: Spokane	07/31/12	1.71 0.20	ND	NR	NR
WA: Tacoma	09/26/12	1.72 0.20	ND	ND	ND
WV: Charleston	07/11/12	1.53 0.18	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 2012

Location	Date Collected	^{90}Sr pCi/L	± 2*u*
IA: Des Moines	07/16/12	0.39	0.47
KY: Louisville	07/09/12	0.2	1.5
MA: Boston	09/19/12	0.41	0.46
MD: Baltimore	07/11/12	−0.1	1.4
MI: Detroit	07/17/12	0.37	0.48
NV: Las Vegas	09/24/12	0.25	0.41
NY: Syracuse	07/09/12	0.40	0.48
TX: Dallas	08/14/12	0.27	0.45
WA: Tacoma	09/26/12	0.51	0.42

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For More Information

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