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ENVIRONMENTAL RADIATION DATA

REPORT 148

October–December 2011

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 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.

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/m³. The laboratory-obtained values are usually lower than the field estimates because of the decay of naturally occurring radionuclides during the time between the two measurements.

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 tritium and gamma-emitting radionuclides. NAREL discontinued gross beta analysis of precipitation in January 2010.

Table 2
Gross Beta in Airborne Particulates
October 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AK: Anchorage	7	0.0	−0.0	0.0	0.003	0.001	0.002
AK: Fairbanks	7	0.1	0.0	0.0	0.007	0.001	0.005
AK: Juneau	8	0.0	−0.0	0.0	0.004	0.001	0.002
AL: Birmingham	9	0.3	0.0	0.1	0.020	0.008	0.013
AL: Montgomery/408	9	0.2	0.0	0.1	0.016	0.004	0.012
AR: Fort Smith	4	0.2	0.0	0.1	0.013	0.009	0.011
AR: Little Rock	9	0.3	0.0	0.1	0.016	0.007	0.011
AZ: Phoenix	9	3.2	0.5	1.4	0.019	0.007	0.015
AZ: Phoenix/956	8	1.3	0.4	0.7	0.018	0.005	0.011
AZ: Tucson	9	0.1	0.0	0.0	0.022	0.005	0.013
CA: Anaheim	8	0.0	0.0	0.0	0.022	0.004	0.014
CA: Bakersfield	6	3.2	0.1	1.5	0.030	0.007	0.021
CA: Eureka	4	0.0	−0.0	0.0	0.006	0.002	0.004
CA: Los Angeles	5	0.0	0.0	0.0	0.019	0.004	0.014
CA: Richmond	4	0.3	0.0	0.1	0.014	0.003	0.009
CA: Riverside	7	0.0	0.0	0.0	0.017	0.004	0.010
CA: Sacramento	9	0.7	0.1	0.3	0.019	0.002	0.010
CA: San Bernardino Cty.	7	0.0	0.0	0.0	0.023	0.005	0.014
CA: San Diego	4	0.1	0.0	0.0	0.019	0.004	0.012
CA: San Francisco	9	0.0	0.0	0.0	0.008	0.001	0.005
CA: San Jose	9	0.2	0.0	0.1	0.016	0.003	0.009
CO: Denver	9	0.8	0.2	0.5	0.021	0.006	0.013
CO: Grand Junction	6	0.2	0.2	0.2	0.027	0.007	0.013
CT: Hartford	9	0.1	0.0	0.0	0.010	0.002	0.004
DC: Washington	7	0.1	0.0	0.1	0.014	0.002	0.007
DE: Dover	7	0.1	0.0	0.0	0.009	0.004	0.006
FL: Jacksonville	7	0.0	0.0	0.0	0.010	0.003	0.006
FL: Miami	5	0.0	0.0	0.0	0.003	0.002	0.003
FL: Orlando	9	0.1	0.0	0.0	0.008	0.002	0.006
FL: Tallahassee	5	0.1	0.1	0.1	0.015	0.007	0.010
FL: Tampa	5	0.0	0.0	0.0	0.009	0.003	0.006
GA: Atlanta	4	0.0	0.0	0.0	0.010	0.008	0.010
GA: Augusta	6	0.3	0.0	0.2	0.009	0.003	0.006
HI: Hilo	9	0.0	0.0	0.0	0.006	0.002	0.003
HI: Honolulu	9	0.0	0.0	0.0	0.004	0.001	0.002
IA: Des Moines	8	0.5	0.0	0.3	0.013	0.004	0.009
IA: Mason City	3	0.2	0.2	0.2	0.015	0.007	0.011
ID: Idaho Falls	9	0.6	0.0	0.3	0.012	0.003	0.009

Table 2 (continued)
Gross Beta in Airborne Particulates
October 2011

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
IL: Aurora	8	0.6	0.1	0.2	0.017	0.002	0.010
IL: Chicago	6	0.5	0.0	0.2	0.021	0.004	0.012
IN: Indianapolis	9	0.3	0.0	0.1	0.021	0.005	0.010
KS: Kansas City	6	0.3	0.1	0.2	0.014	0.005	0.008
KS: Topeka	9	0.7	0.0	0.3	0.016	0.007	0.011
KS: Wichita	8	0.4	0.0	0.2	0.015	0.006	0.009
KY: Lexington	8	0.1	0.0	0.0	0.022	0.006	0.014
KY: Louisville	9	0.2	0.0	0.1	0.012	0.004	0.007
LA: Baton Rouge	9	0.3	0.1	0.2	0.010	0.003	0.006
LA: Shreveport	5	0.0	0.0	0.0	0.009	0.005	0.006
MA: Boston	9	0.1	0.0	0.0	0.010	0.002	0.004
MA: Worcester	5	0.1	0.0	0.0	0.016	0.005	0.008
MD: Baltimore	5	0.0	0.0	0.0	0.010	0.003	0.006
ME: Orono	4	0.0	0.0	0.0	0.007	0.003	0.004
ME: Portland	9	0.0	0.0	0.0	0.008	0.003	0.004
MI: Bay City 48708	9	0.2	0.0	0.1	0.019	0.002	0.008
MI: Detroit	9	0.2	0.0	0.1	0.019	0.004	0.009
MI: Grand Rapids	9	0.1	0.0	0.0	0.022	0.003	0.009
MI: Lansing	9	0.8	0.0	0.2	0.063	0.013	0.029
MN: Duluth	5	0.1	0.0	0.0	0.010	0.002	0.005
MN: St. Paul	4	0.3	0.1	0.2	0.018	0.006	0.010
MO: Jefferson City	8	0.3	0.1	0.2	0.010	0.003	0.007
MO: Springfield	8	0.1	0.0	0.0	0.016	0.004	0.010
MO: St. Louis	7	2.8	0.0	0.7	0.012	0.004	0.008
MS: Jackson/Deq	9	0.5	0.1	0.3	0.013	0.007	0.010
MT: Billings	4	0.0	0.0	0.0	0.015	0.007	0.011
NC: Charlotte	8	0.2	−0.0	0.1	0.015	0.005	0.009
NC: Raleigh	6	0.1	0.0	0.0	0.010	0.004	0.006
NC: Wilmington	4				0.007	0.005	0.006
ND: Bismarck	8	0.2	0.0	0.1	0.013	0.004	0.007
NE: Kearney	7	1.6	0.1	0.6	0.014	0.005	0.009
NE: Lincoln	9	1.1	0.2	0.6	0.015	0.005	0.008
NH: Concord	7	0.0	0.0	0.0	0.005	0.002	0.004
NJ: Edison	6	0.0	−0.0	0.0	0.007	0.003	0.004
NJ: Trenton	7	0.6	0.1	0.2	0.014	0.005	0.008
NM: Albuquerque	4	0.0	0.0	0.0	0.011	0.005	0.008
NM: Carlsbad	6	0.1	0.0	0.0	0.022	0.012	0.018
NM: Navajo Lake St Park	4	0.2	0.0	0.1	0.013	0.011	0.012

Table 2 (continued)
Gross Beta in Airborne Particulates
October 2011

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
NM: Santa Fe	3	0.5	0.0	0.2	0.015	0.006	0.011
NV: Las Vegas/913	1	0.0	0.0	0.0	0.009	0.009	0.009
NV: Reno	7	1.0	0.1	0.4	0.019	0.003	0.013
NY: Albany	8	0.1	0.0	0.1	0.021	0.005	0.009
NY: Lockport	9	0.0	0.0	0.0	0.020	0.003	0.007
NY: New York City	4				0.012	0.005	0.007
NY: Rochester	7	0.1	0.0	0.0	0.012	0.002	0.004
NY: Syracuse	2				0.013	0.004	0.008
NY: Yaphank	5	0.0	0.0	0.0	0.006	0.003	0.004
OH: Cincinnati	8	0.1	0.0	0.1	0.018	0.004	0.009
OH: Cleveland	8	0.1	0.0	0.1	0.017	0.003	0.008
OH: Painesville	7	0.1	0.0	0.0	0.017	0.003	0.008
OH: Toledo	8	0.7	0.0	0.2	0.034	0.006	0.014
OK: Oklahoma City	6	0.3	0.0	0.1	0.013	0.006	0.009
OK: Tulsa	8	0.0	−0.0	0.0	0.014	0.005	0.009
OR: Corvallis	3	0.3	0.0	0.1	0.009	0.003	0.005
OR: Portland	8	0.1	0.0	0.0	0.008	0.003	0.005
PA: Harrisburg	9	0.2	0.0	0.1	0.012	0.004	0.006
PA: Philadelphia	4				0.009	0.005	0.007
PA: Pittsburgh	5	0.2	0.0	0.1	0.017	0.006	0.010
PR: San Juan	7	0.0	0.0	0.0	0.013	0.002	0.007
RI: Providence	4	0.0	−0.0	0.0	0.009	0.004	0.006
SC: Barnwell	1	0.0	0.0	0.0	0.009	0.009	0.009
SC: Columbia	3	0.1	0.0	0.1	0.010	0.009	0.010
SD: Pierre	9	0.9	0.3	0.6	0.014	0.004	0.007
SD: Rapid City	5	0.6	0.2	0.3	0.016	0.009	0.011
TN: Knoxville	4	0.4	0.0	0.2	0.013	0.004	0.008
TN: Memphis	5	0.0	0.0	0.0	0.016	0.010	0.012
TN: Nashville	6	0.1	−0.0	0.0	0.015	0.004	0.010
TN: Oak Ridge/Bethel	9	0.5	0.1	0.3	0.017	0.006	0.011
TN: Oak Ridge/K25	9	0.8	0.2	0.4	0.024	0.006	0.013
TN: Oak Ridge/Melton	9	0.8	0.2	0.4	0.021	0.007	0.013
TN: Oak Ridge/Y12 E	9	0.7	0.1	0.3	0.019	0.006	0.012
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.2	0.020	0.006	0.012
TX: Amarillo	1	0.6	0.6	0.6	0.014	0.014	0.014
TX: Austin	4	0.3	0.0	0.2	0.013	0.005	0.009
TX: Dallas	8	0.4	0.0	0.2	0.010	0.003	0.007
TX: El Paso	5	2.1	0.0	1.1	0.019	0.010	0.014

Table 2 (continued)
Gross Beta in Airborne Particulates
October 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
TX: Ft. Worth	9	0.1	0.0	0.1	0.013	0.006	0.010
TX: Harlingen	3	0.3	0.1	0.2	0.007	0.004	0.006
TX: Houston	5	0.1	0.1	0.1	0.010	0.007	0.008
TX: Laredo	7	0.5	0.0	0.2	0.011	0.004	0.008
TX: Lubbock	3	0.4	0.1	0.3	0.020	0.010	0.013
TX: San Angelo	9	0.7	0.0	0.2	0.014	0.005	0.010
TX: San Antonio	9	1.0	0.2	0.6	0.012	0.004	0.009
UT: Salt Lake City	9	0.4	0.1	0.2	0.023	0.006	0.013
VA: Harrisonburg	8	0.6	0.1	0.4	0.017	0.004	0.007
VA: Lynchburg	9	0.9	0.1	0.5	0.021	0.006	0.011
VA: Richmond	9	0.0	0.0	0.0	0.012	0.003	0.006
VA: Virginia Beach	8	0.1	0.0	0.0	0.009	0.004	0.006
VT: Burlington	8	0.1	0.0	0.0	0.011	0.002	0.004
WA: Olympia	8	0.0	0.0	0.0	0.008	0.002	0.004
WA: Richland	9	0.3	0.1	0.1	0.014	0.002	0.006
WA: Seattle	4	0.0	0.0	0.0	0.004	0.002	0.003
WA: Spokane	9	0.4	0.1	0.2	0.014	0.003	0.006
WI: Madison	8	0.5	0.1	0.3	0.024	0.001	0.010
WI: Milwaukee	8	0.1	0.0	0.0	0.012	0.004	0.007
WV: Charleston	5	0.1	0.0	0.0	0.017	0.006	0.011

Table 3
Gross Beta in Airborne Particulates
November 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AK: Anchorage	7	0.0	−0.0	0.0	0.009	0.003	0.005
AK: Fairbanks	9	0.0	0.0	0.0	0.017	0.005	0.010
AK: Juneau	4	0.0	0.0	0.0	0.004	0.001	0.002
AL: Birmingham	8	0.1	0.0	0.0	0.016	0.005	0.009
AL: Montgomery/408	7	0.1	0.0	0.0	0.014	0.007	0.010
AR: Fort Smith	4	0.0	0.0	0.0	0.016	0.009	0.013
AR: Little Rock	6	0.0	0.0	0.0	0.012	0.005	0.009
AZ: Phoenix	6	3.8	0.3	1.3	0.017	0.008	0.013
AZ: Phoenix/956	7	1.2	0.3	0.8	0.022	0.007	0.012
AZ: Tucson	8	0.1	0.0	0.0	0.016	0.006	0.010
AZ: Yuma	3				0.009	0.008	0.009
CA: Anaheim	9	0.0	0.0	0.0	0.022	0.005	0.011
CA: Bakersfield	7	1.2	0.0	0.3	0.043	0.005	0.018
CA: Eureka	2	0.0	0.0	0.0	0.003	0.001	0.002
CA: Fresno	2	0.2	0.0	0.1	0.032	0.013	0.022
CA: Los Angeles	3	0.1	0.0	0.1	0.015	0.008	0.012
CA: Richmond	5	0.2	0.0	0.1	0.018	0.004	0.010
CA: Riverside	8	0.0	0.0	0.0	0.020	0.003	0.011
CA: Sacramento	7	0.7	0.1	0.3	0.014	0.003	0.007
CA: San Bernardino Cty.	8	0.0	0.0	0.0	0.024	0.004	0.013
CA: San Francisco	8	0.1	0.0	0.0	0.008	0.002	0.004
CA: San Jose	7	0.2	0.0	0.1	0.015	0.002	0.007
CO: Denver	8	1.2	0.1	0.5	0.018	0.009	0.012
CO: Grand Junction	5				0.020	0.010	0.015
CT: Hartford	7	0.1	0.0	0.0	0.012	0.004	0.008
DC: Washington	9	0.1	0.0	0.1	0.011	0.003	0.008
DE: Dover	6	5.3	0.0	0.9	0.008	0.005	0.006
FL: Jacksonville	7	0.0	0.0	0.0	0.007	0.004	0.005
FL: Miami	3	0.0	−0.0	0.0	0.002	0.002	0.002
FL: Orlando	7	0.1	0.0	0.0	0.007	0.002	0.005
FL: Tallahassee	4	0.1	0.0	0.1	0.008	0.004	0.007
GA: Atlanta	4	0.0	0.0	0.0	0.009	0.006	0.007
GA: Augusta	8	0.6	0.0	0.2	0.009	0.003	0.005
HI: Hilo	8	0.0	0.0	0.0	0.004	0.001	0.002
HI: Honolulu	8	0.0	−0.0	0.0	0.003	0.001	0.002
IA: Des Moines	6	0.3	0.1	0.2	0.017	0.006	0.011
IA: Mason City	5	0.8	0.2	0.6	0.014	0.009	0.011
ID: Idaho Falls	8	1.3	0.0	0.5	0.011	0.006	0.008

Table 3 (continued)
Gross Beta in Airborne Particulates
November 2011

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
IL: Aurora	8	1.0	0.0	0.3	0.016	0.009	0.012
IL: Chicago	8	0.2	0.0	0.1	0.010	0.005	0.009
IN: Fort Wayne	1				0.010	0.010	0.010
IN: Indianapolis	8	0.1	0.0	0.1	0.011	0.007	0.008
KS: Kansas City	7	0.2	0.0	0.1	0.015	0.005	0.010
KS: Topeka	6	0.7	0.0	0.3	0.016	0.008	0.012
KS: Wichita	6	0.6	0.1	0.3	0.019	0.009	0.013
KY: Lexington	7	0.0	0.0	0.0	0.016	0.009	0.012
KY: Louisville	7	0.1	0.0	0.1	0.008	0.005	0.007
LA: Baton Rouge	7	0.1	0.0	0.1	0.006	0.003	0.005
LA: Shreveport	9	0.1	0.0	0.0	0.012	0.005	0.007
MA: Boston	8	0.1	0.0	0.0	0.012	0.003	0.006
MA: Worcester	6	0.1	0.0	0.0	0.011	0.006	0.009
MD: Baltimore	7	0.2	0.0	0.1	0.012	0.004	0.008
ME: Orono	4	0.0	0.0	0.0	0.012	0.003	0.007
ME: Portland	4	0.0	0.0	0.0	0.014	0.004	0.008
MI: Bay City 48708	3	0.1	0.0	0.0	0.010	0.009	0.010
MI: Detroit	7	0.2	0.1	0.1	0.011	0.007	0.009
MI: Grand Rapids	6	0.1	0.0	0.0	0.016	0.008	0.012
MI: Lansing	7	0.4	0.1	0.2	0.041	0.025	0.032
MN: Duluth	5	0.2	0.0	0.1	0.014	0.006	0.010
MN: St. Paul	5	0.4	0.0	0.2	0.016	0.009	0.011
MO: Jefferson City	8	0.7	0.0	0.2	0.013	0.004	0.008
MO: Springfield	6	0.1	0.0	0.0	0.014	0.005	0.010
MO: St. Louis	5	1.2	0.0	0.7	0.012	0.005	0.009
MS: Jackson/Deq	7	0.3	0.1	0.1	0.010	0.004	0.007
MT: Billings	5	0.0	0.0	0.0	0.014	0.006	0.010
NC: Charlotte	8	0.1	−0.0	0.0	0.019	0.005	0.008
NC: Raleigh	4	0.0	0.0	0.0	0.008	0.005	0.006
NC: Wilmington	5				0.006	0.005	0.005
ND: Bismarck	6	0.2	0.1	0.1	0.015	0.004	0.010
NE: Kearney	7	0.8	0.2	0.4	0.012	0.005	0.007
NE: Lincoln	7	0.9	0.2	0.6	0.027	0.005	0.012
NH: Concord	6	0.1	0.0	0.0	0.015	0.004	0.008
NJ: Edison	7	0.0	0.0	0.0	0.007	0.004	0.005
NJ: Trenton	8	0.4	0.1	0.2	0.013	0.004	0.010
NM: Albuquerque	4	0.0	0.0	0.0	0.012	0.008	0.010
NM: Carlsbad	3	0.2	0.1	0.2	0.016	0.012	0.013

Table 3 (continued)
Gross Beta in Airborne Particulates
November 2011

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
NM: Navajo Lake St Park	5	0.6	0.0	0.2	0.021	0.009	0.014
NM: Santa Fe	1	0.0	0.0	0.0	0.011	0.011	0.011
NV: Las Vegas/913	7	0.2	0.0	0.1	0.026	0.006	0.013
NV: Reno	8	1.1	0.2	0.5	0.024	0.008	0.014
NY: Albany	8	0.2	0.0	0.1	0.020	0.006	0.011
NY: Lockport	8	0.0	0.0	0.0	0.012	0.006	0.008
NY: New York City	3				0.009	0.007	0.008
NY: Rochester	7	0.1	0.0	0.0	0.009	0.003	0.005
NY: Syracuse	4				0.010	0.006	0.008
NY: Yaphank	3	0.0	−0.0	0.0	0.005	0.003	0.004
OH: Cincinnati	8	0.1	0.0	0.0	0.010	0.006	0.008
OH: Cleveland	7	0.1	0.0	0.0	0.009	0.004	0.007
OH: Painesville	7	0.1	0.0	0.0	0.011	0.008	0.009
OH: Toledo	9	0.2	0.0	0.1	0.015	0.007	0.011
OK: Oklahoma City	6	0.1	0.0	0.0	0.020	0.006	0.010
OK: Tulsa	7	0.0	0.0	0.0	0.021	0.004	0.011
OR: Corvallis	2	0.1	0.0	0.1	0.004	0.002	0.003
OR: Portland	9	0.1	0.0	0.0	0.005	0.002	0.003
PA: Harrisburg	8	0.2	0.0	0.1	0.014	0.005	0.009
PA: Philadelphia	4				0.009	0.004	0.007
PA: Pittsburgh	5	0.2	0.0	0.1	0.012	0.006	0.009
PR: San Juan	8	0.0	−0.0	0.0	0.015	0.001	0.004
RI: Providence	5	0.1	0.0	0.1	0.008	0.005	0.007
SC: Columbia	1	0.0	0.0	0.0	0.010	0.010	0.010
SD: Pierre	7	0.9	0.3	0.5	0.011	0.004	0.007
SD: Rapid City	7	0.7	0.1	0.4	0.020	0.006	0.010
TN: Knoxville	5	0.3	0.0	0.1	0.009	0.004	0.007
TN: Memphis	4	0.1	0.0	0.0	0.009	0.007	0.008
TN: Nashville	9	0.0	−0.0	−0.0	0.010	0.004	0.006
TN: Oak Ridge/Bethel	6	0.4	0.0	0.2	0.015	0.006	0.010
TN: Oak Ridge/K25	6	0.6	0.0	0.3	0.017	0.008	0.012
TN: Oak Ridge/Melton	6	0.5	0.0	0.2	0.017	0.005	0.011
TN: Oak Ridge/Y12 E	6	0.4	0.0	0.2	0.016	0.007	0.011
TN: Oak Ridge/Y12 W	6	0.2	0.0	0.1	0.015	0.007	0.011
TX: Austin	4	0.5	0.0	0.2	0.015	0.007	0.010
TX: Dallas	8	0.9	0.3	0.5	0.014	0.005	0.009
TX: Ft. Worth	6	0.1	0.0	0.1	0.014	0.007	0.010
TX: Harlingen	7	0.7	0.3	0.5	0.011	0.006	0.008

Table 3 (continued)
Gross Beta in Airborne Particulates
November 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
TX: Laredo	4	0.5	0.0	0.3	0.010	0.006	0.008
TX: San Angelo	7	1.0	0.0	0.2	0.017	0.007	0.011
TX: San Antonio	8	0.5	0.1	0.4	0.011	0.007	0.008
UT: Salt Lake City	7	0.3	0.0	0.1	0.014	0.007	0.010
VA: Harrisonburg	7	0.4	0.0	0.2	0.009	0.005	0.008
VA: Lynchburg	7	0.9	0.1	0.4	0.011	0.007	0.010
VA: Richmond	8	0.0	0.0	0.0	0.006	0.003	0.005
VA: Virginia Beach	8	0.1	0.0	0.0	0.008	0.004	0.006
VT: Burlington	8	0.1	0.0	0.0	0.012	0.004	0.008
WA: Olympia	8	0.0	0.0	0.0	0.005	0.001	0.003
WA: Richland	6	0.3	0.0	0.2	0.008	0.003	0.006
WA: Seattle	4	0.0	0.0	0.0	0.003	0.002	0.002
WA: Spokane	7	0.4	0.0	0.1	0.008	0.003	0.006
WI: Madison	9	0.8	0.1	0.3	0.017	0.007	0.012
WI: Milwaukee	7	0.1	0.0	0.0	0.014	0.006	0.010
WV: Charleston	5	0.0	0.0	0.0	0.013	0.008	0.010

Table 4
Gross Beta in Airborne Particulates
December 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AK: Anchorage	8	0.0	−0.0	−0.0	0.004	0.001	0.002
AK: Fairbanks	5	0.0	0.0	0.0	0.011	0.004	0.006
AK: Juneau	7	0.0	−0.0	0.0	0.002	0.001	0.001
AL: Birmingham	8	0.1	0.0	0.0	0.018	0.006	0.010
AL: Montgomery/408	9	0.1	0.0	0.0	0.020	0.007	0.012
AR: Fort Smith	2	0.0	0.0	0.0	0.023	0.013	0.018
AR: Little Rock	7	0.0	0.0	0.0	0.021	0.007	0.012
AZ: Phoenix	8	4.6	0.5	2.0	0.038	0.007	0.021
AZ: Phoenix/956	9	2.0	0.1	0.9	0.026	0.005	0.015
AZ: Tucson	7	0.0	−0.0	0.0	0.022	0.004	0.013
AZ: Yuma	3				0.016	0.008	0.012
CA: Anaheim	9	0.0	0.0	0.0	0.020	0.009	0.014
CA: Bakersfield	9	5.2	0.0	2.1	0.094	0.010	0.049
CA: Eureka	4	0.0	0.0	0.0	0.010	0.003	0.005
CA: Los Angeles	3	0.0	0.0	0.0	0.018	0.007	0.013
CA: Richmond	3	1.0	0.2	0.5	0.033	0.008	0.020
CA: Riverside	8	0.0	0.0	0.0	0.017	0.007	0.011
CA: Sacramento	9	0.7	0.0	0.4	0.046	0.008	0.026
CA: San Bernardino Cty.	9	0.0	0.0	0.0	0.020	0.008	0.013
CA: San Diego	1	0.0	0.0	0.0	0.014	0.014	0.014
CA: San Francisco	9	0.1	0.0	0.0	0.017	0.003	0.009
CA: San Jose	7	0.2	0.1	0.1	0.032	0.004	0.017
CO: Denver	10	0.4	0.0	0.2	0.034	0.009	0.017
CO: Grand Junction	6				0.036	0.014	0.022
CT: Hartford	8	0.1	0.0	0.0	0.014	0.005	0.008
DC: Washington	8	0.1	0.0	0.0	0.016	0.005	0.009
DE: Dover	4	0.0	0.0	0.0	0.011	0.005	0.007
FL: Jacksonville	8	0.0	0.0	0.0	0.008	0.003	0.006
FL: Miami	4	0.0	−0.0	0.0	0.004	0.001	0.002
FL: Orlando	8	0.1	−0.1	0.0	0.011	0.003	0.006
FL: Tallahassee	4	0.1	0.0	0.0	0.011	0.007	0.008
FL: Tampa	6	0.1	0.0	0.0	0.012	0.003	0.007
GA: Atlanta	4	0.0	0.0	0.0	0.012	0.005	0.008
GA: Augusta	8	0.3	0.0	0.1	0.006	0.002	0.005
HI: Hilo	9	0.0	0.0	0.0	0.004	0.002	0.002
HI: Honolulu	9	0.0	0.0	0.0	0.004	0.001	0.002
IA: Des Moines	6	0.4	0.1	0.2	0.022	0.007	0.015
IA: Mason City	6	0.5	0.1	0.3	0.024	0.009	0.017

Table 4 (continued)
Gross Beta in Airborne Particulates
December 2011

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
ID: Idaho Falls	9	1.3	0.1	0.5	0.043	0.005	0.022
IL: Aurora	8	0.4	0.0	0.2	0.023	0.007	0.014
IL: Chicago	9	0.2	−0.1	0.1	0.020	0.007	0.011
IN: Fort Wayne	1				0.008	0.008	0.008
IN: Indianapolis	9	0.1	0.0	0.0	0.023	0.005	0.013
KS: Kansas City	6	0.1	0.0	0.1	0.018	0.007	0.011
KS: Topeka	8	0.3	0.0	0.2	0.026	0.010	0.019
KS: Wichita	8	0.2	0.0	0.1	0.027	0.007	0.015
KY: Lexington	7	0.0	0.0	0.0	0.028	0.010	0.016
KY: Louisville	8	0.1	0.0	0.0	0.017	0.005	0.009
LA: Baton Rouge	8	0.2	0.0	0.1	0.010	0.003	0.007
LA: Shreveport	9	0.0	0.0	0.0	0.019	0.007	0.011
MA: Boston	9	0.0	0.0	0.0	0.008	0.003	0.005
MA: Worcester	7	0.1	0.0	0.0	0.015	0.007	0.010
MD: Baltimore	8	0.1	0.0	0.0	0.015	0.005	0.010
ME: Orono	5	0.0	0.0	0.0	0.008	0.004	0.006
MI: Detroit	9	0.1	0.0	0.1	0.018	0.004	0.009
MI: Grand Rapids	7	0.0	0.0	0.0	0.015	0.006	0.011
MI: Lansing	8	0.2	0.0	0.1	0.050	0.015	0.032
MN: Duluth	6	0.1	0.0	0.1	0.022	0.005	0.009
MN: St. Paul	4	0.2	0.0	0.1	0.017	0.005	0.012
MO: Jefferson City	7	0.2	0.0	0.1	0.015	0.005	0.009
MO: Springfield	6	0.1	0.0	0.0	0.024	0.013	0.019
MO: St. Louis	2	0.0	0.0	0.0	0.017	0.010	0.014
MS: Jackson/Deq	9	0.1	0.0	0.1	0.016	0.008	0.011
MT: Billings	4	0.0	0.0	0.0	0.023	0.009	0.016
NC: Charlotte	9	0.1	0.0	0.0	0.013	0.005	0.008
NC: Raleigh	4	0.0	0.0	0.0	0.011	0.004	0.007
NC: Wilmington	4				0.011	0.004	0.007
ND: Bismarck	7	0.3	0.0	0.1	0.022	0.005	0.010
NE: Kearney	9	0.6	0.2	0.4	0.026	0.005	0.011
NE: Lincoln	9	0.7	0.2	0.4	0.024	0.006	0.013
NE: Omaha	4	0.0	0.0	0.0	0.025	0.008	0.018
NH: Concord	9	0.1	0.0	0.0	0.009	0.003	0.006
NJ: Edison	8	0.0	0.0	0.0	0.010	0.003	0.006
NJ: Trenton	5	0.4	0.0	0.2	0.021	0.006	0.011
NM: Albuquerque	3	0.0	0.0	0.0	0.021	0.014	0.018
NM: Carlsbad	3	0.0	0.0	0.0	0.018	0.013	0.017

Table 4 (continued)
Gross Beta in Airborne Particulates
December 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
NM: Navajo Lake St Park	4	0.6	0.0	0.2	0.026	0.007	0.019
NV: Las Vegas/913	7	0.2	0.0	0.1	0.030	0.009	0.017
NV: Reno	8	0.9	0.2	0.6	0.040	0.009	0.020
NY: Albany	7	0.1	0.0	0.1	0.027	0.006	0.012
NY: Lockport	8	0.0	0.0	0.0	0.011	0.005	0.008
NY: New York City	4				0.012	0.004	0.007
NY: Rochester	7	0.1	0.0	0.0	0.009	0.003	0.005
NY: Syracuse	3				0.014	0.009	0.010
NY: Yaphank	8	0.0	−0.0	0.0	0.008	0.003	0.005
OH: Cincinnati	9	0.3	0.0	0.1	0.019	0.005	0.011
OH: Cleveland	9	0.1	0.0	0.0	0.012	0.003	0.008
OH: Painesville	7	0.1	0.0	0.0	0.018	0.005	0.012
OH: Toledo	8	0.3	0.0	0.1	0.023	0.005	0.013
OK: Oklahoma City	9	0.1	−0.0	0.0	0.020	0.007	0.012
OK: Tulsa	9	0.0	0.0	0.0	0.019	0.008	0.013
OR: Corvallis	7	0.1	0.0	0.1	0.014	0.002	0.007
OR: Portland	9	0.0	0.0	0.0	0.020	0.002	0.008
PA: Harrisburg	9	0.1	0.0	0.0	0.012	0.003	0.006
PA: Philadelphia	4				0.012	0.005	0.008
PA: Pittsburgh	4	0.1	0.0	0.1	0.019	0.007	0.012
PR: San Juan	9	0.0	−0.0	−0.0	0.002	0.001	0.002
RI: Providence	5	0.0	0.0	0.0	0.010	0.003	0.006
SC: Barnwell	1	0.0	0.0	0.0	0.008	0.008	0.008
SC: Columbia	1	0.0	0.0	0.0	0.005	0.005	0.005
SD: Pierre	8	0.5	0.1	0.3	0.010	0.005	0.007
SD: Rapid City	6	0.7	0.2	0.3	0.019	0.008	0.011
TN: Knoxville	5	0.2	0.0	0.0	0.012	0.003	0.009
TN: Memphis	4	0.0	0.0	0.0	0.020	0.010	0.015
TN: Nashville	6	0.0	−0.0	−0.0	0.021	0.007	0.013
TN: Oak Ridge/Bethel	6	0.4	0.1	0.2	0.018	0.005	0.012
TN: Oak Ridge/K25	6	0.6	0.0	0.3	0.019	0.006	0.013
TN: Oak Ridge/Melton	6	0.4	0.2	0.3	0.019	0.007	0.014
TN: Oak Ridge/Y12 E	6	0.3	0.1	0.2	0.019	0.006	0.013
TN: Oak Ridge/Y12 W	6	0.1	0.1	0.1	0.019	0.006	0.013
TX: Austin	5	0.2	0.0	0.1	0.016	0.010	0.013
TX: Corpus Christi	3	0.0	0.0	0.0	0.011	0.005	0.008
TX: Dallas	8	0.7	0.2	0.4	0.017	0.008	0.013
TX: El Paso	4	1.5	0.2	0.8	0.037	0.022	0.031

Table 4 (continued)
Gross Beta in Airborne Particulates
December 2011

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
TX: Ft. Worth	5	0.0	0.0	0.0	0.038	0.010	0.019
TX: Harlingen	7	0.8	0.3	0.6	0.015	0.002	0.009
TX: Houston	9	0.2	0.0	0.1	0.013	0.004	0.009
TX: Laredo	3	0.3	0.1	0.2	0.018	0.007	0.012
TX: Lubbock	1	0.3	0.3	0.3	0.021	0.021	0.021
TX: San Angelo	5	0.0	0.0	0.0	0.023	0.010	0.014
TX: San Antonio	9	0.7	0.1	0.3	0.018	0.005	0.011
UT: Salt Lake City	8	0.5	0.1	0.3	0.064	0.007	0.033
VA: Harrisonburg	9	0.2	0.0	0.1	0.015	0.005	0.009
VA: Lynchburg	7	0.7	0.3	0.5	0.018	0.007	0.012
VA: Richmond	7	0.0	0.0	0.0	0.012	0.003	0.006
VA: Virginia Beach	8	0.0	0.0	0.0	0.016	0.003	0.007
VT: Burlington	9	0.0	0.0	0.0	0.017	0.004	0.008
WA: Olympia	9	0.0	0.0	0.0	0.012	0.001	0.005
WA: Richland	9	0.5	0.1	0.2	0.048	0.002	0.022
WA: Seattle	5	0.0	0.0	0.0	0.008	0.002	0.004
WA: Spokane	8	0.3	0.0	0.2	0.040	0.002	0.019
WI: Madison	8	0.4	0.1	0.2	0.021	0.005	0.013
WI: Milwaukee	8	0.0	0.0	0.0	0.017	0.006	0.010
WV: Charleston	6	0.0	0.0	0.0	0.017	0.005	0.011

Table 5
Specific Gamma in Precipitation
October 2011

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	Pb-212	1.4	1.3
AR: Little Rock		ND	
CA: Richmond	Cs-137	0.77	0.64
CO: Denver		ND	
CT: Hartford		ND	
FL: Jacksonville		ND	
GA: Atlanta		ND	
MA: Boston		ND	
MI: Lansing		ND	
MN: St. Paul	Tl-208	0.75	0.66
NC: Charlotte		ND	
NC: Wilmington	Tl-208	1.5	1.4
NM: Santa Fe		ND	
NY: Albany	Ra-224	24	23
	Tl-208	1.5	1.3
NY: Yaphank		ND	
OH: Painesville	Be-7	59	47
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25		ND	
TN: Oak Ridge/Melton	Pb-212	2.3	2.2
TN: Oak Ridge/Y12 E		ND	
TX: Austin		ND	
UT: Salt Lake City		ND	
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 6
Specific Gamma in Precipitation
November 2011

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
AR: Little Rock		ND	
AZ: Phoenix	Tl-208	1.7	1.3
CA: Richmond		ND	
CO: Denver		ND	
CT: Hartford		ND	
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls	Tl-208	1.02	0.68
KS: Kansas City	Pb-212	2.7	2.3
MA: Boston		ND	
MI: Lansing		ND	
NC: Charlotte	Bi-212	12	11
NC: Wilmington		ND	
NH: Concord		ND	
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville		ND	
OR: Portland	Tl-208	1.3	1.2
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville	Be-7	41	35
	Pb-212	1.7	1.3
TN: Oak Ridge/K25	Be-7	66	57
	Ra-228	4.9	3.9
TN: Oak Ridge/Melton	Ra-224	33	22
TN: Oak Ridge/Y12 E	Be-7	57	37
	Tl-208	0.62	0.62
TX: Austin		ND	
UT: Salt Lake City		ND	
VA: Lynchburg		ND	
WA: Olympia	Pb-212	2.8	2.1

Table 7
Specific Gamma in Precipitation
December 2011

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
AR: Little Rock	Tl-208	0.71	0.66
AZ: Phoenix	Be-7	36	34
	Ra-228	2.5	2.1
CA: Richmond	K-40	102	71
	Pb-212	16	15
CO: Denver	Be-7	55	55
	K-40	14	12
CT: Hartford		ND	
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu	Th-227	9.4	6.8
ID: Idaho Falls	K-40	18	13
KS: Kansas City		ND	
MA: Boston		ND	
MN: St. Paul		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NH: Concord		ND	
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville	K-40	15	13
OR: Portland		ND	
PA: Harrisburg	Tl-208	1.5	1.2
TN: Knoxville	Tl-208	1.3	1.1
TN: Nashville		ND	
TN: Oak Ridge/K25	Pb-212	2.8	2.3
TN: Oak Ridge/Melton	Bi-212	9.4	9.3
	Tl-208	1.2	1.2
TN: Oak Ridge/Y12 E		ND	
TX: Austin		ND	
TX: El Paso		ND	
VA: Lynchburg	K-40	13	11
WA: Olympia		ND	

Table 8
Tritium in Precipitation
October–December 2011

Location	October 2011 pCi/L	± 2*u*	November 2011 pCi/L	± 2*u*	December 2011 pCi/L	± 2*u*
AL: Montgomery/408	−66	94	−6	89	94	95
AR: Little Rock	−44	94	−50	88	−80	85
AZ: Phoenix	NS		51	78	−75	86
CA: Richmond	−23	94	60	78	730	120
CO: Denver	−21	95	47	77	2	89
CT: Hartford	28	81	−78	92	53	78
FL: Jacksonville	−7	79	10	90	−5	75
GA: Atlanta	−62	93	−54	87	11	76
HI: Honolulu	NS		15	76	−61	86
ID: Idaho Falls	NS		51	78	−39	87
KS: Kansas City	NS		−28	89	−61	86
MA: Boston	−13	79	68	93	51	78
MI: Lansing	0	95	−18	88	NS	
MN: St. Paul	−27	94	NS		−37	87
NC: Charlotte	−4	80	18	90	47	77
NC: Wilmington	−18	79	−10	89	33	77
NH: Concord	NS		−48	93	18	77
NM: Santa Fe	−15	96	NS		NS	
NY: Albany	6	80	58	92	29	77
NY: Yaphank	29	81	4	90	7	75
OH: Painesville	40	98	−50	87	60	93
OR: Portland	−96	92	31	77	−2	89
PA: Harrisburg	4	80	−84	86	40	78
TN: Knoxville	NS		−30	88	−48	89
TN: Nashville	−4	95	−60	87	36	77
TN: Oak Ridge/K25	−65	93	46	92	64	93
TN: Oak Ridge/Melton	110	100	−6	90	260	100
TN: Oak Ridge/Y12 E	−36	95	−14	88	20	91
TX: Austin	−68	93	−22	89	−57	87
TX: El Paso	NS		NS		−118	84
UT: Salt Lake City	−65	92	71	79	NS	
VA: Lynchburg	−53	93	38	92	7	76
WA: Olympia	−70	93	−13	75	−36	88

Note: NS = No Sample

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.

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.

Note: The protocol for drinking water collection and analysis changed in 2011 as a result of the laboratory's response to the Fukushima Nuclear Incident (FNI) in March. An aliquot of each drinking water sample collected during this quarter was shipped another laboratory for gamma analysis. The results of those analyses are not reported in the ERDs. The aliquot retained by NAREL was analyzed for ^{131}I, and those results are reported in this ERD. Information on RadNet data analyzed as part of the FNI response can be found at www.epa.gov/japan2011.

Table 9
Tritium in Drinking Water
October–December 2011

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	10/12/11	64	89
AL: Dothan	10/13/11	34	88
AL: Montgomery	10/12/11	90	91
AL: Muscle Shoals	10/04/11	46	93
AL: Scottsboro	10/03/11	66	93
AR: Little Rock	10/12/11	32	88
CA: Los Angeles	10/17/11	4	87
CA: Richmond	10/03/11	10	90
CT: Hartford	10/07/11	7	81
DE: Dover	10/11/11	80	90
FL: Tampa	10/10/11	18	88
GA: Baxley	12/06/11	−58	79
GA: Savannah	12/13/11	42	82
HI: Honolulu	12/19/11	−47	78
IA: Cedar Rapids	10/31/11	23	83
ID: Boise	10/11/11	72	89
ID: Idaho Falls	10/24/11	4	83
IL: Morris	11/16/11	−41	81
IL: W. Chicago	12/05/11	−87	78
KS: Topeka	12/08/11	−63	77
LA: New Orleans	12/16/11	−11	79
MD: Baltimore	10/05/11	15	81
MI: Grand Rapids	12/22/11	14	80
MN: St. Paul	10/04/11	56	93
MN: Welch	10/04/11	−8	90
MO: Jefferson City	10/07/11	−16	79
MS: Jackson	10/12/11	44	88
MS: Port Gibson	10/11/11	48	89
MT: Helena	11/22/11	−57	80
ND: Bismarck	11/23/11	14	82
NE: Lincoln	10/07/11	−11	80
NH: Concord	11/01/11	0	82
NJ: Trenton	11/22/11	27	84
NJ: Waretown	11/28/11	−52	80
NM: Santa Fe	12/30/11	32	81
NY: Albany	12/14/11	−33	79
NY: New York City	10/24/11	−73	79
NY: Niagara Falls	10/12/11	189	96
NY: Syracuse	11/09/11	−28	81
OH: Cincinnati	10/11/11	60	90

Table 9 (continued)
Tritium in Drinking Water
October–December 2011

Location	Date Collected	^{3}H pCi/L	± 2*u*
OH: Columbus	11/28/11	−112	77
OH: E. Liverpool	11/16/11	−23	81
OH: Painesville	11/30/11	12	83
OH: Toledo	10/05/11	151	97
OR: Portland	12/29/11	−2	80
PA: Philadelphia/Baxter	12/07/11	−29	78
PA: Philadelphia/Belmont	12/07/11	20	81
PA: Philadelphia/Queen	12/07/11	−13	80
PA: Pittsburgh	11/15/11	−4	82
RI: Providence	11/23/11	−75	79
SC: Barnwell	10/17/11	24	89
SC: Columbia	10/18/11	109	92
SC: Jenkinsville	10/12/11	74	90
SC: Seneca	10/10/11	52	89
TN: Knoxville	11/08/11	−55	80
TN: Oak Ridge/#360	10/04/11	58	89
TN: Oak Ridge/#371	10/04/11	40	82
TN: Oak Ridge/#4442	10/04/11	33	82
TN: Oak Ridge/#768	10/04/11	−4	90
TN: Oak Ridge/#772	10/04/11	−27	90
TX: Austin	10/20/11	36	88
VA: Ashland	12/16/11	3840	240
VA: Lynchburg	10/06/11	64	89
WA: Richland	11/02/11	−32	82
WI: Madison	10/27/11	−28	81

Table 10
Iodine-131 in Drinking Water
January–December 2011

Location	Date Collected	^{131}I pCi/L	± 2*u*
AK: Fairbanks	03/08/11	0.04	0.17
AK: Fairbanks	04/13/11	0.05	0.17
AL: Dothan	04/04/11	0.03	0.13
AL: Dothan	04/29/11	0.05	0.28
AL: Montgomery	02/17/11	0.12	0.34
AL: Montgomery	04/01/11	0.12	0.14
AL: Montgomery	04/15/11	0.031	0.087
AL: Muscle Shoals	03/31/11	0.16	0.15
AL: Muscle Shoals	04/27/11	0.01	0.17
AL: Scottsboro	03/30/11	0.16	0.20
AL: Scottsboro	04/28/11	0.09	0.17
AR: Little Rock	02/25/11	0.04	0.12
AR: Little Rock	03/29/11	0.07	0.15
AR: Little Rock	04/13/11	0.07	0.15
CA: Los Angeles	04/04/11	0.39	0.14
CA: Los Angeles	04/12/11	0.18	0.11
CA: Richmond	02/23/11	−0.05	0.16
CA: Richmond	03/29/11	0.06	0.23
CA: Richmond	04/13/11	0.08	0.12
CO: Denver	03/30/11	0.17	0.16
CO: Denver	04/13/11	−0.20	0.34
CT: Hartford	04/06/11	−0.05	0.19
CT: Hartford	04/14/11	0.07	0.13
DE: Dover	03/28/11	−0.05	0.14
DE: Dover	04/13/11	0.02	0.11
FL: Miami	03/29/11	−0.08	0.14
FL: Tampa	01/28/11	0.04	0.35
FL: Tampa	03/29/11	0.09	0.19
FL: Tampa	04/18/11	0.16	0.19
GA: Baxley	03/29/11	−0.06	0.12
GA: Baxley	04/14/11	0.09	0.13
GA: Savannah	03/28/11	0.00	0.12
GA: Savannah	04/13/11	0.03	0.14
HI: Honolulu	03/28/11	0.02	0.14
HI: Honolulu	04/19/11	0.10	0.13
IA: Cedar Rapids	02/24/11	0.04	0.13
IA: Cedar Rapids	04/13/11	0.09	0.12
ID: Boise	02/11/11	0.13	0.19
ID: Boise	03/28/11	0.20	0.13
ID: Boise	04/14/11	0.09	0.16
ID: Idaho Falls	03/10/11	−0.04	0.17

Table 10 (continued)
Iodine-131 in Drinking Water
January–December 2011

Location	Date Collected	^{131}I pCi/L	± 2*u*
ID: Idaho Falls	03/28/11	0.05	0.11
ID: Idaho Falls	04/15/11	−0.05	0.13
IL: Morris	03/29/11	0.09	0.40
IL: Morris	04/19/11	−0.09	0.13
IL: W. Chicago	02/07/11	0.07	0.16
IL: W. Chicago	04/05/11	0.06	0.37
IL: W. Chicago	04/27/11	−0.08	0.33
KS: Topeka	03/31/11	0.08	0.31
KS: Topeka	04/14/11	0.15	0.12
LA: New Orleans	03/28/11	−0.01	0.12
LA: New Orleans	04/13/11	0.09	0.11
MD: Baltimore	03/28/11	0.01	0.16
MD: Baltimore	04/13/11	0.17	0.27
MD: Conowingo	03/29/11	0.01	0.12
MD: Conowingo	04/19/11	0.04	0.14
MI: Detroit	03/31/11	0.27	0.16
MI: Detroit	04/27/11	0.11	0.30
MI: Grand Rapids	03/29/11	0.04	0.17
MI: Grand Rapids	04/21/11	0.24	0.27
MN: St. Paul	03/28/11	0.01	0.15
MN: St. Paul	04/13/11	0.16	0.13
MN: Welch	03/29/11	−0.10	0.16
MO: Jefferson City	02/03/11	0.05	0.39
MO: Jefferson City	03/28/11	0.08	0.12
MO: Jefferson City	04/12/11	0.07	0.16
MS: Jackson	03/29/11	−0.01	0.12
MS: Jackson	04/13/11	0.01	0.12
MS: Port Gibson	03/29/11	0.15	0.18
MS: Port Gibson	04/19/11	−0.02	0.11
MT: Helena	03/28/11	0.18	0.15
MT: Helena	04/13/11	0.063	0.091
NC: Charlotte	03/28/11	0.13	0.20
NC: Charlotte	04/13/11	0.00	0.16
NC: Raleigh	04/13/11	0.071	0.098
ND: Bismarck	03/28/11	0.10	0.10
ND: Bismarck	04/13/11	0.10	0.13
NE: Lincoln	02/03/11	0.02	0.17
NE: Lincoln	03/29/11	0.02	0.13
NE: Lincoln	04/13/11	0.10	0.11
NH: Concord	04/07/11	0.09	0.16
NH: Concord	04/07/11	0.13	0.14

Table 10 (continued)
Iodine-131 in Drinking Water
January–December 2011

Location	Date Collected	^{131}I pCi/L	± 2*u*
NH: Concord	04/12/11	0.02	0.26
NH: Concord	04/18/11	0.04	0.15
NH: Concord	04/25/11	−0.12	0.20
NJ: Trenton	01/24/11	0.28	0.17
NJ: Trenton	03/29/11	0.38	0.16
NJ: Waretown	01/24/11	−0.03	0.18
NJ: Waretown	03/28/11	0.38	0.34
NJ: Waretown	04/19/11	−0.10	0.28
NM: Santa Fe	03/28/11	0.10	0.18
NM: Santa Fe	04/18/11	−0.11	0.24
NV: Las Vegas	03/30/11	−0.01	0.19
NV: Las Vegas	04/15/11	−0.02	0.15
NY: Albany	03/29/11	−0.07	0.11
NY: Albany	04/13/11	0.10	0.12
NY: New York City	02/23/11	0.04	0.14
NY: New York City	03/29/11	−0.03	0.13
NY: New York City	04/13/11	0.03	0.13
NY: Niagara Falls	03/31/11	0.14	0.13
NY: Niagara Falls	04/13/11	0.103	0.092
NY: Syracuse	02/03/11	−0.06	0.21
NY: Syracuse	03/29/11	0.02	0.12
NY: Syracuse	04/13/11	0.03	0.13
OH: Cincinnati	01/28/11	0.12	0.19
OH: Cincinnati	03/28/11	0.13	0.12
OH: Cincinnati	04/13/11	0.03	0.12
OH: Columbus	03/29/11	0.03	0.12
OH: Columbus	04/13/11	0.20	0.12
OH: E. Liverpool	03/30/11	0.42	0.11
OH: E. Liverpool	04/14/11	0.14	0.11
OH: Painesville	02/22/11	−0.08	0.16
OH: Painesville	03/29/11	0.43	0.18
OH: Painesville	04/13/11	0.22	0.12
OH: Toledo	03/30/11	0.15	0.19
OK: Oklahoma City	02/17/11	−0.19	0.31
OK: Oklahoma City	03/28/11	−0.04	0.20
OK: Oklahoma City	04/13/11	0.06	0.18
OR: Portland	03/25/11	0.10	0.32
OR: Portland	04/13/11	0.06	0.14
PA: Columbia	03/29/11	0.20	0.11
PA: Columbia	04/13/11	0.06	0.15
PA: Harrisburg	03/29/11	0.10	0.13

Table 10 (continued)
Iodine-131 in Drinking Water
January–December 2011

Location	Date Collected	^{131}I pCi/L	± 2*u*
PA: Harrisburg	04/14/11	0.133	0.098
PA: Philadelphia/Baxter	02/14/11	0.42	0.26
PA: Philadelphia/Baxter	04/04/11	0.46	0.14
PA: Philadelphia/Baxter	04/14/11	0.36	0.11
PA: Philadelphia/Baxter	08/31/11	0.07	0.19
PA: Philadelphia/Baxter	12/07/11	0.26	0.14
PA: Philadelphia/Belmont	02/14/11	2.90	0.37
PA: Philadelphia/Belmont	04/04/11	1.29	0.19
PA: Philadelphia/Belmont	04/14/11	1.87	0.24
PA: Philadelphia/Belmont	08/31/11	0.57	0.18
PA: Philadelphia/Belmont	12/07/11	0.16	0.34
PA: Philadelphia/Queen	02/14/11	2.58	0.34
PA: Philadelphia/Queen	04/04/11	2.21	0.28
PA: Philadelphia/Queen	04/14/11	1.25	0.19
PA: Philadelphia/Queen	08/31/11	1.32	0.25
PA: Philadelphia/Queen	12/07/11	0.09	0.14
PA: Pittsburgh	03/28/11	0.36	0.15
PA: Pittsburgh	04/14/11	0.11	0.15
RI: Providence	03/30/11	0.00	0.18
RI: Providence	04/15/11	0.09	0.25
SC: Barnwell	03/31/11	0.03	0.15
SC: Barnwell	04/14/11	0.02	0.19
SC: Columbia	01/28/11	0.04	0.17
SC: Columbia	03/30/11	0.08	0.26
SC: Columbia	04/14/11	0.05	0.15
SC: Jenkinsville	01/27/11	0.22	0.18
SC: Jenkinsville	03/30/11	0.07	0.16
SC: Jenkinsville	04/13/11	0.11	0.17
SC: Seneca	04/04/11	0.10	0.25
SC: Seneca	04/18/11	0.04	0.15
TN: Chattanooga	03/28/11	1.65	0.24
TN: Chattanooga	04/15/11	0.00	0.13
TN: Knoxville	02/07/11	0.01	0.16
TN: Knoxville	04/05/11	0.28	0.28
TN: Knoxville	04/13/11	0.061	0.089
TN: Oak Ridge/#360	01/25/11	0.03	0.17
TN: Oak Ridge/#360	03/29/11	0.18	0.13
TN: Oak Ridge/#360	04/14/11	0.11	0.14
TN: Oak Ridge/#371	01/25/11	−0.03	0.14
TN: Oak Ridge/#371	03/29/11	0.63	0.13
TN: Oak Ridge/#371	04/14/11	0.01	0.15

Table 10 (continued)
Iodine-131 in Drinking Water
January–December 2011

Location	Date Collected	^{131}I pCi/L	± 2*u*
TN: Oak Ridge/#4442	01/25/11	0.06	0.17
TN: Oak Ridge/#4442	03/29/11	0.28	0.13
TN: Oak Ridge/#4442	04/14/11	0.04	0.17
TN: Oak Ridge/#768	01/25/11	0.05	0.16
TN: Oak Ridge/#768	03/29/11	0.01	0.14
TN: Oak Ridge/#768	04/14/11	0.00	0.18
TN: Oak Ridge/#772	01/25/11	−0.05	0.16
TN: Oak Ridge/#772	03/29/11	0.20	0.13
TN: Oak Ridge/#772	04/14/11	0.01	0.29
TX: Austin	03/28/11	0.04	0.11
TX: Austin	04/12/11	0.08	0.12
VA: Ashland	03/29/11	0.07	0.10
VA: Ashland	04/15/11	−0.03	0.16
VA: Lynchburg	03/28/11	0.12	0.12
VA: Lynchburg	03/28/11	0.06	0.11
VA: Lynchburg	04/11/11	0.12	0.14
WA: Richland	02/24/11	0.04	0.13
WA: Richland	03/28/11	0.23	0.12
WA: Richland	04/13/11	0.02	0.31
WA: Seattle	03/28/11	−0.05	0.15
WI: Madison	03/07/11	−0.05	0.27
WI: Madison	03/29/11	−0.041	0.099
WI: Madison	04/13/11	−0.005	0.088

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 11

Radionuclides in Pasteurized Milk

October–December 2011

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	12/10/11	1.63 0.19	ND	ND	ND
AZ: Phoenix	12/16/11	1.68 0.20	ND	ND	NR
CA: Los Angeles	12/12/11	1.70 0.19	ND	ND	NR
CA: San Francisco	10/12/11	1.88 0.22	2.5 2.0	NR	NR
CT: Hartford	12/12/11	1.58 0.19	ND	ND	ND
DE: Wilmington	10/24/11	1.64 0.20	ND	NR	NR
FL: Plant City	10/18/11	1.65 0.19	ND	NR	NR
HI: Hilo	10/12/11	1.74 0.20	ND	NR	NR
IA: Des Moines	11/08/11	1.70 0.19	ND	ND	NR
KS: Wichita	11/30/11	1.69 0.19	ND	ND	NR
KY: Louisville	10/05/11	1.71 0.19	ND	ND	ND
MA: Boston	12/16/11	1.64 0.19	ND	ND	ND
MD: Baltimore	10/05/11	1.68 0.19	ND	ND	ND
MI: Detroit	11/15/11	1.67 0.20	ND	ND	NR
MO: Jefferson City	10/25/11	1.65 0.19	ND	NR	NR
NJ: Trenton	10/12/11	1.63 0.19	ND	NR	NR
NM: Albuquerque	10/20/11	1.59 0.19	ND	NR	NR
NY: Buffalo	12/12/11	1.67 0.20	ND	ND	NR
NY: Syracuse	10/06/11	1.71 0.20	ND	ND	ND
OH: Cincinnati	12/13/11	1.70 0.20	ND	ND	NR
OH: Cleveland	12/15/11	1.62 0.19	ND	ND	NR
OR: Portland	10/10/11	1.69 0.19	ND	NR	NR
PA: Pittsburgh	10/04/11	1.57 0.18	ND	ND	ND
TN: Chattanooga	10/05/11	1.58 0.18	ND	ND	ND
TN: Knoxville	10/03/11	1.61 0.19	ND	ND	ND
TN: Memphis	10/17/11	1.65 0.19	ND	NR	NR
TX: Dallas	10/17/11	1.63 0.19	ND	NR	NR
TX: Dallas	10/17/11	1.61 0.20	ND	NR	NR
TX: San Antonio	10/24/11	1.52 0.18	ND	NR	NR
WA: Spokane	10/27/11	1.64 0.19	ND	NR	NR
WA: Tacoma	12/27/11	1.65 0.19	ND	ND	ND
WV: Charleston	10/17/11	1.61 0.20	ND	NR	NR

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

For More Information

Environmental Radiation Data (ERD) is published quarterly by the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air.

Requests for information concerning the operation of RadNet and the data that are generated should be directed as follows:

Requests for information concerning the operation of RadNet, the data that are generated, or publication and distribution of ERD should be directed to:

Charles M. Petko
Office of the Director
National Analytical Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
email: petko.charles@epa.gov

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

Jonathan Edwards
USEPA - ORIA
Radiation Protection Division (MC6608J)
1200 Pennsylvania Ave. N.W.
Washington, DC 20460
email: edwards.jonathan@epa.gov

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