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## Preface

*Environmental Radiation Data*(ERD) is compiled and published quarterly by the Office of Radiation and Indoor Air's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and contains data from the RadNet monitoring system (formerly ERAMS). ERD is published in both hard-copy and electronic formats. Electronic reports are available online at [www.epa.gov/narel](http://www.epa.gov/narel).

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 these samples include gross alpha and gross beta analysis, gamma analyses, and radionuclide-specific analyses for uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides ancillary information on natural background levels and on routine and accidental releases into the environment from stationary sources.

The radiochemical procedures used by NAREL to analyze the RadNet samples are contained in the *NAREL Radiochemistry Procedures Manual*. Station operation and sample collection are in accordance with procedures contained in the *ERAMS Manual*(EPA 520/5-84-007, 008, 009).

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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 Air and 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/m <sup>3</sup>	0.0015
	Water	pCi/L	2
	Precipitation	pCi/L	2
Tritium	Water	pCi/L	150
	Milk	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m <sup>3</sup>	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m <sup>3</sup>	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 m<sup>3</sup>. Measurement by alpha spectrometry includes combined activities of <sup>239</sup>Pu and <sup>240</sup>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<sup>3</sup>.

‡ 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. Airborne particulates are collected continuously at field stations representing wide geographic coverage throughout the United States.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a dual-phosphor scintillation counter 5 hours after collection to allow natural radon isotopes and their 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/m<sup>3</sup>. 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.

A compilation of individual measurements is available from the National Air and Radiation Environmental Laboratory, 540 South Morris Avenue, Montgomery, AL 36115-2601.

**Table 2**  
**Gross Beta in Airborne Particulates**  
**April 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
AK: Anchorage	7	0.0	0.0	0.0	0.010	0.001	0.006
AK: Fairbanks	7	0.0	0.0	0.0	0.034	0.002	0.013
AK: Juneau	6	0.0	0.0	0.0	0.008	0.002	0.005
AL: Birmingham	6	0.2	0.0	0.0	0.047	0.011	0.018
AL: Montgomery/408	7	0.1	0.0	0.1	0.016	0.008	0.012
AR: Fort Smith	3	0.2	0.0	0.1	0.013	0.006	0.009
AR: Little Rock	7	0.1	0.0	0.1	0.017	0.007	0.011
AZ: Phoenix	6	1.3	0.4	0.8	0.017	0.007	0.013
AZ: Phoenix/956	6	0.6	0.2	0.4	0.111	0.010	0.049
AZ: Tucson	8	0.0	-0.0	0.0	0.071	0.009	0.020
CA: Anaheim	7	0.0	0.0	0.0	0.021	0.006	0.012
CA: Bakersfield	6	1.0	0.2	0.5	0.085	0.005	0.032
CA: Eureka	4	0.0	-0.0	0.0	0.007	0.000	0.004
CA: Fresno	6	0.3	0.1	0.1	0.022	0.006	0.013
CA: Los Angeles	6	0.1	0.0	0.0	0.023	0.006	0.012
CA: Richmond	6	0.2	0.0	0.1	0.016	0.004	0.009
CA: Riverside	7	0.0	0.0	0.0	0.022	0.007	0.012
CA: Sacramento	7	0.2	0.1	0.1	0.020	0.003	0.008
CA: San Bernardino Cty.	7				0.092	0.008	0.024
CA: San Diego	3	0.0	0.0	0.0	0.013	0.006	0.010
CA: San Francisco	7	0.0	0.0	0.0	0.011	0.004	0.006
CA: San Jose	5	0.1	0.0	0.1	0.029	0.005	0.014
CO: Colorado Springs	4				0.020	0.010	0.015
CO: Denver	7	0.6	0.2	0.3	0.017	0.004	0.009
CO: Grand Junction	4	0.3	0.2	0.2	0.036	0.008	0.015
CT: Hartford	6	0.1	0.0	0.0	0.017	0.006	0.012
DC: Washington	7	0.0	0.0	0.0	0.008	0.003	0.005
DE: Dover	7	0.0	-0.0	0.0	0.015	0.005	0.008
FL: Jacksonville	6	0.0	0.0	0.0	0.009	0.002	0.007
FL: Miami	4	0.0	0.0	0.0	0.005	0.003	0.004
FL: Orlando	6	0.1	0.0	0.0	0.019	0.003	0.010
FL: Tallahassee	4	0.2	0.1	0.1	0.020	0.013	0.016
FL: Tampa	5	0.0	0.0	0.0	0.010	0.004	0.008
GA: Atlanta	4	0.1	0.0	0.0	0.016	0.008	0.012
GA: Augusta	7	0.4	0.1	0.2	0.031	0.002	0.014
HI: Hilo	7	0.0	0.0	0.0	0.006	0.004	0.005
HI: Honolulu	7	0.1	-0.0	0.0	0.006	0.003	0.004
IA: Des Moines	6	0.4	0.1	0.2	0.049	0.006	0.015



**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
**April 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
IA: Mason City	4	0.4	0.0	0.2	0.019	0.008	0.012
ID: Idaho Falls	7	0.5	0.1	0.2	0.074	0.006	0.020
IL: Aurora	5	0.5	0.0	0.2	0.081	0.007	0.025
IL: Chicago	4	0.1	0.0	0.1	0.011	0.004	0.008
IN: Fort Wayne	2	0.1	0.1	0.1	0.031	0.011	0.021
IN: Indianapolis	7	0.1	0.0	0.1	0.029	0.006	0.012
KS: Kansas City	7	0.2	0.0	0.1	0.072	0.003	0.019
KS: Topeka	7	0.4	0.0	0.2	0.025	0.006	0.014
KS: Wichita	6	0.9	0.1	0.4	0.022	0.006	0.012
KY: Lexington	5	0.0	-0.0	0.0	0.010	0.004	0.007
KY: Louisville	7	0.1	0.0	0.1	0.011	0.004	0.008
LA: Baton Rouge	7	0.2	-0.1	0.1	0.007	0.005	0.006
LA: Shreveport	6	0.0	0.0	0.0	0.010	0.004	0.008
MA: Boston	7	0.1	0.0	0.0	0.018	0.005	0.010
MA: Worcester	6	0.1	0.0	0.0	0.022	0.006	0.012
MD: Baltimore	6	0.0	0.0	0.0	0.017	0.007	0.010
ME: Orono	5	0.0	0.0	0.0	0.021	0.003	0.012
ME: Portland	5	0.0	-0.0	0.0	0.016	0.005	0.009
MI: Bay City 48708	6	0.1	0.0	0.0	0.017	0.008	0.012
MI: Detroit	6	0.1	0.0	0.1	0.023	0.007	0.013
MI: Grand Rapids	7	0.0	0.0	0.0	0.013	0.005	0.010
MN: Duluth	5	0.1	0.0	0.0	0.014	0.005	0.010
MN: St. Paul	5	0.3	0.0	0.1	0.013	0.007	0.010
MO: Jefferson City	7	0.2	0.0	0.1	0.036	0.005	0.013
MO: Springfield	6	0.1	0.0	0.0	0.019	0.005	0.010
MO: St. Louis	2	-0.0	-0.0	-0.0	0.009	0.005	0.007
MS: Jackson/Deq	6	0.3	0.1	0.1	0.020	0.007	0.010
MT: Billings	4	0.2	0.0	0.1	0.013	0.009	0.010
NC: Charlotte	7	0.1	0.0	0.0	0.015	0.003	0.008
NC: Raleigh	3	0.2	0.0	0.1	0.009	0.004	0.007
NC: Wilmington	5				0.014	0.007	0.010
ND: Bismarck	6	0.1	0.0	0.1	0.010	0.006	0.008
NE: Kearney	1	0.3	0.3	0.3	0.007	0.007	0.007
NE: Lincoln	7	0.7	0.1	0.4	0.044	0.005	0.013
NE: Omaha	4	0.6	0.0	0.4	0.065	0.005	0.034
NH: Concord	4	0.0	0.0	0.0	0.013	0.005	0.010
NJ: Edison	7	0.0	-0.0	0.0	0.022	0.003	0.009
NJ: Trenton	6	0.2	0.1	0.1	0.022	0.006	0.014

**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
**April 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
NM: Albuquerque	7	0.0	0.0	0.0	0.012	0.005	0.008
NM: Carlsbad	8	0.2	0.0	0.1	0.017	0.007	0.013
NM: Navajo Lake St Park	3	0.1	0.0	0.0	0.011	0.004	0.008
NM: Santa Fe	4	0.5	0.0	0.2	0.012	0.007	0.009
NV: Las Vegas/913	6	0.3	0.0	0.1	0.035	0.009	0.018
NV: Reno	7	0.5	-0.5	0.1	0.048	0.010	0.024
NY: Albany	6	0.1	0.0	0.1	0.031	0.005	0.014
NY: Lockport	7	0.0	0.0	0.0	0.009	0.006	0.008
NY: New York City	4				0.015	0.008	0.012
NY: Rochester	6	0.1	0.0	0.0	0.008	0.004	0.007
NY: Yaphank	6	0.0	0.0	0.0	0.012	0.003	0.007
OH: Cincinnati	7	0.1	0.0	0.1	0.022	0.006	0.011
OH: Cleveland	6	0.1	0.0	0.1	0.011	0.005	0.007
OH: Columbus	2	0.1	0.0	0.0	0.013	0.011	0.012
OH: Painesville	6	0.1	0.0	0.0	0.019	0.007	0.011
OH: Toledo	6	0.2	0.0	0.1	0.023	0.009	0.014
OK: Oklahoma City	6	0.0	0.0	0.0	0.012	0.006	0.009
OK: Tulsa	6	0.0	0.0	0.0	0.012	0.005	0.008
OR: Corvallis	7	0.0	0.0	0.0	0.009	0.001	0.004
OR: Portland	7	0.0	0.0	0.0	0.008	0.001	0.004
PA: Philadelphia	4				0.014	0.004	0.008
PA: Pittsburgh	5	0.1	0.0	0.1	0.019	0.005	0.011
PR: San Juan	7	0.0	-0.0	0.0	0.007	0.002	0.004
RI: Providence	3	0.1	0.0	0.0	0.014	0.007	0.010
SC: Barnwell	2	0.1	0.0	0.0	0.035	0.007	0.021
SC: Columbia	5	0.1	0.0	0.1	0.043	0.004	0.019
SD: Pierre	7	0.4	0.1	0.2	0.033	0.006	0.011
SD: Rapid City	4	0.3	0.1	0.2	0.070	0.006	0.028
TN: Knoxville	5	0.4	0.1	0.2	0.070	0.007	0.023
TN: Memphis	3	0.0	0.0	0.0	0.009	0.009	0.009
TN: Nashville	6	0.0	-0.0	0.0	0.009	0.004	0.006
TN: Oak Ridge/Bethel	5	0.4	0.1	0.2	0.046	0.008	0.025
TN: Oak Ridge/K25	5	0.5	0.1	0.3	0.058	0.008	0.029
TN: Oak Ridge/Melton	5	0.4	0.1	0.2	0.048	0.007	0.022
TN: Oak Ridge/Y12 E	5	0.2	0.1	0.2	0.035	0.008	0.020
TN: Oak Ridge/Y12 W	5	0.2	0.1	0.1	0.027	0.007	0.015
TX: Amarillo	4	0.3	0.0	0.1	0.014	0.008	0.011
TX: Austin	5	0.3	0.0	0.2	0.028	0.008	0.014

**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
**April 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
TX: Corpus Christi	5	0.4	0.0	0.2	0.022	0.007	0.014
TX: Dallas	7	0.3	0.0	0.2	0.061	0.006	0.016
TX: El Paso	6	0.8	0.4	0.5	0.045	0.011	0.023
TX: Ft. Worth	6	0.3	0.1	0.2	0.024	0.009	0.013
TX: Harlingen	7	0.6	0.0	0.2	0.062	0.007	0.023
TX: Houston	6	0.1	0.1	0.1	0.051	0.004	0.016
TX: Laredo	3	0.5	0.1	0.2	0.017	0.008	0.012
TX: Lubbock	6	0.6	0.0	0.3	0.026	0.011	0.018
TX: San Angelo	8	0.0	0.0	0.0	0.016	0.007	0.012
TX: San Antonio	6	0.5	0.3	0.3	0.056	0.007	0.022
UT: Salt Lake City	6	0.2	0.1	0.1	0.025	0.014	0.020
VA: Harrisonburg	6	0.3	0.0	0.1	0.016	0.005	0.010
VA: Lynchburg	6	0.4	0.1	0.2	0.037	0.007	0.014
VA: Richmond	5	0.0	0.0	0.0	0.009	0.005	0.007
VA: Virginia Beach	6	0.1	-0.0	0.0	0.013	0.004	0.009
VT: Burlington	3				0.024	0.009	0.017
WA: Olympia	5	0.0	0.0	0.0	0.007	0.001	0.004
WA: Richland	7	0.2	0.0	0.1	0.024	0.002	0.010
WA: Seattle	5	0.0	0.0	0.0	0.005	0.002	0.003
WA: Spokane	7	0.1	0.0	0.1	0.012	0.002	0.007
WI: Madison	7	0.2	0.1	0.1	0.030	0.002	0.012
WI: Milwaukee	5	0.0	0.0	0.0	0.011	0.008	0.010
WV: Charleston	6	0.0	0.0	0.0	0.015	0.006	0.011

**Table 3**  
**Gross Beta in Airborne Particulates**  
**May 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
AK: Anchorage	9	0.0	0.0	0.0	0.005	0.001	0.003
AK: Fairbanks	9	0.1	0.0	0.0	0.010	0.003	0.006
AK: Juneau	9	0.0	0.0	0.0	0.006	0.000	0.003
AL: Birmingham	6	0.1	0.0	0.0	0.015	0.007	0.012
AL: Montgomery/408	9	0.1	0.0	0.1	0.019	0.009	0.012
AR: Fort Smith	1	0.0	0.0	0.0	0.007	0.007	0.007
AR: Little Rock	7	0.1	0.0	0.0	0.013	0.005	0.010
AZ: Phoenix	9	3.0	0.3	1.0	0.015	0.007	0.010
AZ: Phoenix/956	7	0.5	0.1	0.3	0.011	0.005	0.008
AZ: Tucson	9	0.9	-0.0	0.1	0.018	0.006	0.010
CA: Anaheim	9	0.0	0.0	0.0	0.010	0.003	0.006
CA: Bakersfield	8	1.1	0.0	0.4	0.080	0.003	0.017
CA: Eureka	5	0.0	0.0	0.0	0.003	0.001	0.002
CA: Fresno	7	0.3	0.0	0.2	0.010	0.003	0.006
CA: Los Angeles	6	0.1	0.0	0.0	0.009	0.004	0.006
CA: Richmond	4	0.1	0.0	0.1	0.006	0.003	0.004
CA: Riverside	9	0.0	0.0	0.0	0.010	0.002	0.006
CA: Sacramento	9	0.4	0.1	0.2	0.009	0.002	0.005
CA: San Bernardino Cty.	8				0.012	0.004	0.008
CA: San Diego	5	0.1	0.0	0.0	0.009	0.005	0.007
CA: San Francisco	8	0.0	0.0	0.0	0.003	0.002	0.002
CA: San Jose	9	0.1	0.0	0.0	0.008	0.003	0.005
CO: Colorado Springs	3				0.014	0.007	0.010
CO: Denver	9	0.4	0.1	0.2	0.015	0.005	0.009
CO: Grand Junction	4				0.012	0.004	0.007
CT: Hartford	9	0.1	0.0	0.0	0.014	0.001	0.006
DC: Washington	8	0.0	0.0	0.0	0.005	0.003	0.004
DE: Dover	7	0.1	0.0	0.0	0.009	0.003	0.005
FL: Jacksonville	9	0.0	0.0	0.0	0.012	0.005	0.007
FL: Miami	4	0.0	0.0	0.0	0.007	0.002	0.005
FL: Orlando	9	0.1	0.0	0.0	0.011	0.004	0.008
FL: Tallahassee	3	0.0	0.0	0.0	0.014	0.012	0.013
FL: Tampa	9	0.1	0.0	0.0	0.014	0.003	0.008
GA: Atlanta	4	0.1	0.0	0.0	0.014	0.007	0.011
GA: Augusta	9	0.5	0.1	0.2	0.017	0.002	0.009
HI: Hilo	9	0.0	0.0	0.0	0.005	0.003	0.004
HI: Honolulu	9	0.0	0.0	0.0	0.004	0.002	0.003
IA: Des Moines	9	0.3	0.1	0.2	0.013	0.005	0.009

**Table 3 (continued)**  
**Gross Beta in Airborne Particulates**  
**May 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
IA: Mason City	8	0.8	0.1	0.3	0.011	0.003	0.007
ID: Idaho Falls	9	0.5	0.1	0.2	0.008	0.003	0.006
IL: Aurora	6	0.6	-0.0	0.2	0.015	0.007	0.010
IL: Chicago	5	0.1	0.0	0.1	0.011	0.004	0.007
IN: Fort Wayne	1				0.010	0.010	0.010
IN: Indianapolis	9	0.2	0.0	0.1	0.013	0.005	0.009
KS: Kansas City	8	0.2	0.0	0.1	0.009	0.003	0.006
KS: Topeka	9	0.4	0.0	0.2	0.011	0.005	0.009
KS: Wichita	8	0.7	0.0	0.2	0.014	0.005	0.010
KY: Lexington	8	0.0	-0.0	0.0	0.010	0.003	0.007
KY: Louisville	7	0.1	0.0	0.0	0.010	0.003	0.007
LA: Baton Rouge	7	0.1	0.0	0.1	0.008	0.004	0.005
LA: Shreveport	8	0.0	0.0	0.0	0.008	0.002	0.007
MA: Boston	9	0.1	0.0	0.0	0.009	0.001	0.004
MA: Worcester	9	0.1	0.0	0.0	0.012	0.001	0.005
MD: Baltimore	8	0.1	0.0	0.0	0.013	0.004	0.008
ME: Orono	4	0.0	0.0	0.0	0.004	0.002	0.003
ME: Portland	9	0.0	-0.0	0.0	0.008	0.001	0.003
MI: Bay City 48708	9	0.1	0.0	0.0	0.006	0.002	0.005
MI: Detroit	9	0.1	0.0	0.1	0.009	0.004	0.005
MI: Grand Rapids	9	0.0	0.0	0.0	0.007	0.002	0.005
MN: Duluth	4	0.0	0.0	0.0	0.005	0.003	0.005
MN: St. Paul	5	0.1	0.0	0.0	0.006	0.004	0.006
MO: Jefferson City	7	0.1	0.0	0.1	0.009	0.006	0.007
MO: Springfield	8	0.1	0.0	0.0	0.011	0.004	0.008
MO: St. Louis	4	-0.0	-0.0	-0.0	0.009	0.006	0.007
MS: Jackson/Deq	9	0.2	0.0	0.1	0.014	0.006	0.009
MT: Billings	6	0.1	0.0	0.1	0.009	0.004	0.006
NC: Charlotte	8	0.1	0.0	0.0	0.011	0.002	0.008
NC: Raleigh	6	0.4	0.0	0.1	0.011	0.007	0.009
NC: Wilmington	4				0.009	0.006	0.007
ND: Bismarck	8	0.2	0.0	0.1	0.008	0.003	0.005
NE: Kearney	3	0.3	0.0	0.1	0.008	0.004	0.006
NE: Lincoln	6	0.5	0.2	0.4	0.009	0.005	0.006
NE: Omaha	5	0.0	0.0	0.0	0.010	0.005	0.007
NH: Concord	1	0.0	0.0	0.0	0.004	0.004	0.004
NJ: Edison	7	0.0	0.0	0.0	0.007	0.002	0.004
NJ: Trenton	9	0.3	0.0	0.1	0.013	0.003	0.007

**Table 3 (continued)**  
**Gross Beta in Airborne Particulates**  
**May 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
NM: Albuquerque	5	0.0	0.0	0.0	0.009	0.006	0.008
NM: Carlsbad	9	0.2	0.0	0.1	0.017	0.009	0.013
NM: Navajo Lake St Park	5	0.1	0.1	0.1	0.007	0.004	0.006
NM: Santa Fe	4	0.1	0.0	0.0	0.010	0.006	0.008
NV: Las Vegas/913	8	0.2	0.0	0.1	0.011	0.004	0.007
NV: Reno	9	0.3	0.1	0.2	0.014	0.004	0.009
NY: Albany	9	0.1	0.0	0.1	0.013	0.003	0.007
NY: Lockport	9	0.0	0.0	0.0	0.007	0.003	0.005
NY: New York City	4				0.006	0.003	0.004
NY: Rochester	7	0.0	0.0	0.0	0.005	0.002	0.003
NY: Yaphank	6	0.0	0.0	0.0	0.003	0.002	0.002
OH: Cincinnati	9	0.2	0.0	0.1	0.014	0.003	0.009
OH: Cleveland	8	0.1	0.0	0.1	0.007	0.003	0.006
OH: Painesville	8	0.1	0.0	0.0	0.009	0.004	0.006
OH: Toledo	9	0.1	0.0	0.1	0.010	0.003	0.008
OK: Oklahoma City	5	0.0	0.0	0.0	0.009	0.002	0.007
OK: Tulsa	7	0.0	0.0	0.0	0.010	0.003	0.008
OR: Corvallis	3	0.0	0.0	0.0	0.003	0.001	0.002
OR: Portland	9	0.0	-0.0	0.0	0.005	0.001	0.003
PA: Philadelphia	4				0.008	0.003	0.005
PA: Pittsburgh	5	0.1	0.0	0.0	0.008	0.006	0.007
PR: San Juan	9	0.0	-0.0	0.0	0.014	0.002	0.005
RI: Providence	1	0.0	0.0	0.0	0.006	0.006	0.006
SC: Barnwell	2	0.1	0.0	0.0	0.009	0.008	0.008
SC: Columbia	5	0.1	0.0	0.0	0.013	0.010	0.012
SD: Pierre	9	0.6	0.2	0.3	0.009	0.004	0.006
SD: Rapid City	8	0.4	0.1	0.2	0.010	0.002	0.006
TN: Knoxville	8	0.7	0.1	0.4	0.017	0.006	0.012
TN: Memphis	5	0.0	0.0	0.0	0.009	0.005	0.007
TN: Nashville	9	0.1	-0.0	0.0	0.011	0.004	0.007
TN: Oak Ridge/Bethel	8	0.7	0.1	0.4	0.018	0.005	0.011
TN: Oak Ridge/K25	8	1.0	0.2	0.6	0.015	0.005	0.011
TN: Oak Ridge/Melton	8	0.7	0.1	0.4	0.015	0.005	0.011
TN: Oak Ridge/Y12 E	8	0.8	0.1	0.4	0.015	0.005	0.011
TN: Oak Ridge/Y12 W	8	0.4	0.1	0.2	0.015	0.005	0.010
TX: Amarillo	5	0.6	0.0	0.2	0.014	0.006	0.011
TX: Austin	5	0.3	0.0	0.1	0.015	0.006	0.010
TX: Corpus Christi	5	0.2	-0.0	0.0	0.011	0.002	0.008

**Table 3 (continued)**  
**Gross Beta in Airborne Particulates**  
**May 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
TX: Dallas	7	0.2	0.0	0.1	0.008	0.002	0.006
TX: El Paso	9	1.0	0.4	0.6	0.024	0.011	0.016
TX: Ft. Worth	6	0.2	0.1	0.1	0.011	0.005	0.009
TX: Harlingen	9	0.3	0.0	0.1	0.013	0.007	0.009
TX: Houston	8	0.2	0.0	0.1	0.009	0.000	0.005
TX: Laredo	7	0.5	0.1	0.3	0.013	0.007	0.011
TX: Lubbock	7	1.8	0.0	1.0	0.021	0.008	0.012
TX: San Angelo	7	0.2	0.0	0.0	0.014	0.005	0.011
TX: San Antonio	8	0.3	0.2	0.2	0.010	0.005	0.007
UT: Salt Lake City	9	0.4	0.0	0.1	0.020	0.004	0.011
VA: Harrisonburg	8	0.9	-0.1	0.3	0.012	0.005	0.009
VA: Lynchburg	7	0.5	0.0	0.3	0.012	0.005	0.009
VA: Richmond	7	0.0	0.0	0.0	0.010	0.003	0.006
VA: Virginia Beach	9	0.1	0.0	0.1	0.013	0.004	0.008
VT: Burlington	1				0.003	0.003	0.003
WA: Olympia	9	0.0	0.0	0.0	0.005	0.001	0.003
WA: Richland	9	0.4	0.0	0.1	0.006	0.002	0.004
WA: Seattle	4	0.0	0.0	0.0	0.004	0.002	0.003
WA: Spokane	9	0.1	0.0	0.1	0.006	0.003	0.004
WI: Madison	9	0.8	0.1	0.3	0.009	0.003	0.006
WI: Milwaukee	6	0.1	-0.0	0.0	0.010	0.003	0.005
WV: Charleston	5	0.0	-0.0	0.0	0.011	0.002	0.008

**Table 4**  
**Gross Beta in Airborne Particulates**  
**June 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
AK: Anchorage	8	0.0	-0.0	0.0	0.002	0.000	0.001
AK: Fairbanks	8	0.1	0.0	0.0	0.008	0.001	0.003
AK: Juneau	6	0.0	0.0	0.0	0.004	0.001	0.003
AL: Birmingham	8	0.1	0.0	0.0	0.038	0.010	0.017
AL: Montgomery/408	8	0.2	0.0	0.1	0.064	0.011	0.023
AR: Fort Smith	1	0.0	0.0	0.0	0.007	0.007	0.007
AR: Little Rock	9	0.2	0.0	0.1	0.024	0.007	0.012
AZ: Phoenix	9	1.9	0.3	1.0	0.021	0.008	0.014
AZ: Phoenix/956	8	0.7	-0.0	0.4	0.015	0.007	0.011
AZ: Tucson	8	0.0	0.0	0.0	0.014	0.007	0.011
CA: Anaheim	6	0.0	0.0	0.0	0.008	0.003	0.005
CA: Bakersfield	8	0.6	0.0	0.3	0.010	0.004	0.006
CA: Eureka	4	0.0	-0.0	0.0	0.002	0.001	0.002
CA: Fresno	4	0.1	0.0	0.1	0.006	0.004	0.005
CA: Los Angeles	4	0.0	0.0	0.0	0.008	0.005	0.006
CA: Richmond	5	0.1	0.0	0.0	0.005	0.000	0.003
CA: Riverside	8	0.0	0.0	0.0	0.009	0.005	0.007
CA: Sacramento	8	0.3	0.1	0.2	0.005	0.002	0.004
CA: San Bernardino Cty.	8	0.0	0.0	0.0	0.011	0.005	0.008
CA: San Diego	4	0.0	0.0	0.0	0.006	0.003	0.005
CA: San Francisco	9	0.0	0.0	0.0	0.004	0.001	0.002
CA: San Jose	8	0.1	0.0	0.0	0.005	0.001	0.003
CO: Denver	8	1.3	0.3	0.8	0.022	0.011	0.016
CO: Grand Junction	5				0.013	0.008	0.011
CT: Hartford	6	0.1	0.0	0.0	0.010	0.003	0.006
DC: Washington	7	0.1	0.0	0.1	0.014	0.004	0.008
DE: Dover	6	0.1	0.0	0.0	0.012	0.005	0.007
FL: Jacksonville	8	0.2	0.0	0.0	0.011	0.003	0.008
FL: Miami	6	0.0	-0.0	0.0	0.007	0.004	0.005
FL: Tallahassee	4	0.1	0.0	0.1	0.014	0.009	0.011
FL: Tampa	9	0.1	0.0	0.0	0.012	0.004	0.008
GA: Atlanta	3	0.0	0.0	0.0	0.018	0.010	0.014
GA: Augusta	7	0.6	0.1	0.2	0.014	0.006	0.010
HI: Hilo	9	0.0	0.0	0.0	0.004	0.002	0.003
HI: Honolulu	8	0.0	0.0	0.0	0.003	0.001	0.002
IA: Des Moines	9	0.4	0.0	0.2	0.025	0.004	0.010
IA: Mason City	4	0.3	0.0	0.1	0.008	0.004	0.006
ID: Idaho Falls	9	0.5	0.1	0.2	0.010	0.005	0.008



**Table 4 (continued)**  
**Gross Beta in Airborne Particulates**  
**June 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
IL: Chicago	8	0.2	0.0	0.1	0.016	0.005	0.009
IN: Fort Wayne	2				0.011	0.008	0.009
IN: Indianapolis	8	0.4	0.0	0.1	0.018	0.005	0.010
KS: Kansas City	9	0.2	0.0	0.1	0.015	0.003	0.008
KS: Topeka	9	0.6	0.0	0.2	0.019	0.006	0.010
KS: Wichita	7	0.6	0.0	0.3	0.021	0.007	0.011
KY: Lexington	9	0.3	0.0	0.1	0.014	0.004	0.009
KY: Louisville	7	0.3	0.0	0.1	0.017	0.005	0.009
LA: Baton Rouge	7	0.2	0.1	0.1	0.011	0.003	0.007
LA: Shreveport	6	0.1	0.0	0.0	0.012	0.005	0.008
MA: Boston	8	0.1	0.0	0.0	0.007	0.002	0.004
MA: Worcester	9	0.1	0.0	0.0	0.008	0.003	0.006
MD: Baltimore	7	0.2	0.0	0.1	0.018	0.008	0.011
ME: Orono	4	0.0	0.0	0.0	0.006	0.003	0.004
ME: Portland	8	0.0	0.0	0.0	0.008	0.002	0.004
MI: Bay City 48708	7	0.1	0.0	0.0	0.012	0.004	0.006
MI: Detroit	9	0.4	0.1	0.2	0.015	0.003	0.007
MI: Grand Rapids	9	0.1	0.0	0.0	0.019	0.004	0.008
MN: Duluth	7	0.1	-0.0	0.0	0.009	0.003	0.005
MN: St. Paul	4	0.2	0.0	0.1	0.009	0.005	0.006
MO: Jefferson City	8	0.2	0.0	0.1	0.019	0.005	0.009
MO: Springfield	2	0.3	0.0	0.1	0.017	0.012	0.014
MS: Jackson/Deq	7	0.5	0.1	0.2	0.024	0.006	0.011
MT: Billings	8	0.3	0.0	0.1	0.010	0.005	0.007
NC: Charlotte	6	0.2	0.0	0.1	0.016	0.007	0.011
NC: Raleigh	6	0.0	-0.0	0.0	0.013	0.006	0.009
NC: Wilmington	5				0.009	0.006	0.008
ND: Bismarck	8	0.1	0.0	0.1	0.008	0.003	0.006
NE: Kearney	8	0.7	0.2	0.4	0.010	0.005	0.007
NE: Lincoln	8	0.4	0.1	0.2	0.014	0.005	0.007
NE: Omaha	3	0.0	0.0	0.0	0.008	0.005	0.007
NH: Concord	2	0.0	0.0	0.0	0.004	0.003	0.004
NJ: Edison	8	0.0	0.0	0.0	0.012	0.003	0.006
NJ: Trenton	6	0.7	0.1	0.4	0.014	0.007	0.011
NM: Albuquerque	3	0.0	0.0	0.0	0.009	0.007	0.008
NM: Carlsbad	6	0.3	-0.0	0.1	0.020	0.015	0.016
NM: Navajo Lake St Park	2	0.0	0.0	0.0	0.009	0.003	0.006
NM: Santa Fe	3	0.1	0.0	0.0	0.011	0.008	0.009

**Table 4 (continued)**  
**Gross Beta in Airborne Particulates**  
**June 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
NV: Las Vegas/913	8	0.2	0.0	0.1	0.015	0.006	0.009
NV: Reno	8	0.3	0.1	0.2	0.013	0.007	0.010
NY: Albany	8	0.2	0.0	0.1	0.015	0.003	0.008
NY: Lockport	8	0.0	0.0	0.0	0.011	0.002	0.006
NY: New York City	1				0.010	0.010	0.010
NY: Rochester	9	0.2	0.0	0.1	0.010	0.002	0.005
NY: Syracuse	1				0.004	0.004	0.004
NY: Yaphank	4	0.0	0.0	0.0	0.007	0.003	0.004
OH: Cincinnati	7	1.0	0.0	0.2	0.024	0.004	0.010
OH: Cleveland	6	0.2	0.0	0.1	0.008	0.004	0.007
OH: Painesville	6	0.1	0.0	0.1	0.011	0.005	0.007
OH: Toledo	9	0.9	0.0	0.3	0.021	0.004	0.010
OK: Oklahoma City	8	0.0	0.0	0.0	0.016	0.005	0.009
OK: Tulsa	8	0.0	-0.0	0.0	0.020	0.007	0.012
OR: Corvallis	6	0.0	0.0	0.0	0.003	0.001	0.001
OR: Portland	8	0.0	0.0	0.0	0.003	0.001	0.002
PA: Harrisburg	7	0.3	0.0	0.1	0.010	0.004	0.007
PA: Philadelphia	3				0.010	0.007	0.009
PR: San Juan	8	0.0	-0.0	0.0	0.013	0.004	0.009
RI: Providence	2	0.0	0.0	0.0	0.011	0.005	0.008
SC: Columbia	4	0.2	0.0	0.1	0.014	0.009	0.011
SD: Pierre	7	1.2	0.0	0.3	0.012	0.005	0.007
SD: Rapid City	5	0.5	0.1	0.3	0.009	0.004	0.008
TN: Knoxville	6	0.5	0.1	0.2	0.021	0.006	0.011
TN: Memphis	3	0.0	0.0	0.0	0.016	0.006	0.012
TN: Nashville	7	0.1	-0.0	0.0	0.014	0.006	0.009
TN: Oak Ridge/Bethel	9	0.9	0.2	0.5	0.022	0.006	0.012
TN: Oak Ridge/K25	9	1.1	0.2	0.7	0.020	0.008	0.013
TN: Oak Ridge/Melton	9	1.3	0.2	0.6	0.026	0.008	0.013
TN: Oak Ridge/Y12 E	9	1.1	0.1	0.4	0.025	0.007	0.013
TN: Oak Ridge/Y12 W	9	0.5	0.1	0.3	0.022	0.007	0.012
TX: Amarillo	1	0.0	0.0	0.0	0.014	0.014	0.014
TX: Austin	4	0.0	0.0	0.0	0.013	0.007	0.010
TX: Corpus Christi	1	0.1	0.1	0.1	0.010	0.010	0.010
TX: Dallas	6	0.4	0.2	0.3	0.015	0.006	0.009
TX: El Paso	7	0.8	0.6	0.7	0.025	0.016	0.018
TX: Ft. Worth	5	0.1	0.0	0.1	0.014	0.005	0.010
TX: Harlingen	8	0.8	0.1	0.4	0.010	0.004	0.007

**Table 4 (continued)**  
**Gross Beta in Airborne Particulates**  
**June 2011**

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m <sup>3</sup> )	Avg	Max	Min (pCi/m <sup>3</sup> )	Avg
TX: Houston	5	0.4	0.2	0.3	0.012	0.002	0.008
TX: Laredo	7	0.9	0.2	0.4	0.010	0.005	0.007
TX: Lubbock	9	3.6	0.1	0.9	0.021	0.010	0.014
TX: San Angelo	7	0.3	0.0	0.0	0.016	0.006	0.010
TX: San Antonio	10	0.6	0.1	0.3	0.011	0.004	0.007
UT: Salt Lake City	9	0.2	0.1	0.2	0.015	0.007	0.011
VA: Harrisonburg	10	2.0	0.2	0.8	0.016	0.008	0.012
VA: Lynchburg	9	1.4	0.2	0.5	0.018	0.006	0.012
VA: Richmond	8	0.0	0.0	0.0	0.013	0.004	0.008
VA: Virginia Beach	8	0.1	0.0	0.1	0.012	0.006	0.009
WA: Olympia	8	0.0	0.0	0.0	0.005	0.001	0.002
WA: Richland	8	0.2	0.0	0.1	0.005	0.002	0.004
WA: Seattle	5	0.0	0.0	0.0	0.003	0.001	0.002
WA: Spokane	9	0.2	0.0	0.1	0.006	0.002	0.005
WI: Madison	6	0.4	0.1	0.2	0.012	0.004	0.007
WI: Milwaukee	8	0.0	0.0	0.0	0.009	0.003	0.006
WV: Charleston	6	0.0	0.0	0.0	0.016	0.005	0.011

**Table 5**  
**Specific Gamma in Precipitation**  
**April 2011**

Location	Nuclide	pCi/L $\pm 2u$	
AL: Montgomery/408		ND	
AR: Little Rock	Tl208	0.71	0.71
CA: Richmond	Cs134	5.1	1.3
	Cs137	6.6	1.5
	Tl208	1.4	1.4
CO: Denver		ND	
CT: Hartford		ND	
FL: Jacksonville	Tl208	1.25	0.69
GA: Atlanta		ND	
HI: Honolulu	Pb212	2.9	2.5
ID: Idaho Falls	Ra224	35	24
	Rn220	670	600
KS: Kansas City		ND	
MA: Boston	Tl208	1.3	1.3
MI: Lansing		ND	
MN: St. Paul	Tl208	1.4	1.3
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington	Tl208	2.6	2.6
NH: Concord		ND	
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville		ND	
OR: Portland	Cs137	1.18	0.97
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Cs137	1.02	0.89
TN: Oak Ridge/Melton	Cs137	1.23	0.94
TN: Oak Ridge/Y12 E		ND	
TX: Austin		ND	
UT: Salt Lake City	Tl208	1.2	1.1
VA: Lynchburg	Tl208	1.3	1.3
WA: Olympia		ND	

**Table 6**  
**Specific Gamma in Precipitation**  
**May 2011**

Location	Nuclide	pCi/L $\pm$ 2 $\sigma$	
AL: Montgomery/408	Pb212	2.9	2.8
AR: Little Rock		ND	
CA: Richmond	Cs137	2.3	1.0
CO: Denver	Tl208	1.5	1.3
CT: Hartford		ND	
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston		ND	
MI: Lansing		ND	
MN: St. Paul	Pb212	1.9	1.9
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25		ND	
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E	Pb212	2.9	2.7
	Tl208	1.3	1.3
TX: Austin		ND	
UT: Salt Lake City	Tl208	1.6	1.3
VA: Lynchburg	K40	13	12
WA: Olympia		ND	

**Table 7**  
**Specific Gamma in Precipitation**  
**June 2011**

Location	Nuclide	pCi/L $\pm$ 2u	
AL: Montgomery/408		ND	
CA: Richmond		ND	
CO: Denver		ND	
CT: Hartford	Be7	96	84
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu	Pb212	1.6	1.3
ID: Idaho Falls		ND	
KS: Kansas City	Tl208	0.72	0.56
MA: Boston		ND	
MI: Lansing	Pb212	5.2	2.5
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NY: Albany		ND	
NY: Yaphank		ND	
OH: Painesville		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville	Tl208	1.4	1.3
TN: Nashville		ND	
TN: Oak Ridge/K25	Be7	88	61
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E		ND	
UT: Salt Lake City		ND	
VA: Lynchburg	K40	13	12
WA: Olympia		ND	

**Table 8**  
**Tritium in Precipitation**  
**April - June 2011**

Location	April 2011 pCi/L ± 2 <i>u</i>	May 2011 pCi/L ± 2 <i>u</i>	June 2011 pCi/L ± 2 <i>u</i>
AL: Montgomery/408	-54 91	-67 85	6 85
AR: Little Rock	-51 86	-30 86	NS
CA: Richmond	20 89	262 99	36 91
CO: Denver	-8 87	34 89	79 92
CT: Hartford	49 97	26 88	90 89
FL: Jacksonville	-8 94	-56 84	104 90
GA: Atlanta	-19 93	-40 86	108 91
HI: Honolulu	-18 86	6 88	19 90
ID: Idaho Falls	47 90	24 89	123 96
KS: Kansas City	33 89	64 90	52 91
MA: Boston	2 94	6 87	44 87
MI: Lansing	-82 92	-28 86	143 93
MN: St. Paul	-15 93	109 92	138 92
MN: Welch/510	-8 94	-34 85	480 110
NC: Charlotte	-32 93	10 88	116 90
NC: Wilmington	32 95	-64 84	143 91
NH: Concord	17 95	NS	NS
NY: Albany	-4 93	-46 83	82 89
NY: Yaphank	-13 95	-26 86	96 91
OH: Painesville	-49 92	-8 88	68 89
OR: Portland	-26 86	-16 86	58 91
PA: Harrisburg	-40 93	-57 85	34 86
TN: Knoxville	-15 94	-62 84	104 90
TN: Nashville	-30 93	-40 85	91 89
TN: Oak Ridge/K25	61 97	-42 85	89 90
TN: Oak Ridge/Melton	180 100	215 97	156 93
TN: Oak Ridge/Y12 E	-27 92	11 87	111 91
TX: Austin	2 88	73 90	NS
UT: Salt Lake City	32 89	70 90	11 90
VA: Lynchburg	-28 87	-26 86	70 89
WA: Olympia	-6 87	42 90	82 93

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 continuously operating airborne particulate samplers.

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.

Plutonium and uranium results are published when they become available.



## 2. Drinking Water Program

The RadNet drinking water program provides data on radionuclide concentrations in the nation's drinking water supplies. Samples are taken at 78 sites which are either major population centers or selected nuclear facility environs.

Drinking water data are used to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA "National Interim Primary Drinking Water Regulations." These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/L, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/L, when tritium levels do not exceed 20,000 pCi/L, when the strontium-90 levels do not exceed 8 pCi/L, and when the gross beta levels do not exceed 50 pCi/L.

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; and (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.

**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 to another laboratory for gamma analysis. The results of those analyses are not reported in this ERD. The aliquot retained by NAREL was analyzed for  $^{131}\text{I}$  but not for  $^3\text{H}$ , therefore results are not available for this quarter. The results of the  $^{131}\text{I}$  analyses are reported in ERD 148. Information on RadNet data analyzed as part of the FNI response can be found at [www.epa.gov/japan2011](http://www.epa.gov/japan2011).

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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.

Quarterly samples are collected at approximately 55 sampling sites. The samples are composited, according to production, from the major milk suppliers representing more than 80 percent of the milk consumed in a given population center.

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 10**  
**Radionuclides in Pasteurized Milk**  
**April - June 2011**

Location	Date Collected	K g/L ± 2u	<sup>137</sup> Cs pCi/L ± 2u	<sup>140</sup> Ba pCi/L ± 2u	<sup>131</sup> I pCi/L ± 2u
AR: Little Rock	04/13/11	1.55 0.19	ND	ND	ND
CA: Los Angeles	04/13/11	1.50 0.19	ND	ND	4.0 2.7
CA: Oakland	04/13/11	1.81 0.22	ND	ND	3.7 1.9
CT: Hartford	04/12/11	1.54 0.19	ND	ND	ND
CT: Hartford	04/20/11	1.58 0.20	ND	ND	ND
DE: Wilmington	04/18/11	1.58 0.20	ND	ND	ND
FL: Plant City	04/13/11	1.47 0.19	ND	ND	ND
HI: Hilo	04/13/11	1.61 0.21	10.0 3.4	ND	ND
KS: Wichita	04/12/11	1.56 0.19	ND	ND	ND
KY: Louisville	04/13/11	1.55 0.19	ND	ND	ND
MD: Baltimore	04/15/11	1.51 0.19	ND	ND	ND
MI: E. Lansing	04/12/11	1.55 0.20	ND	ND	ND
MO: Jefferson City	04/13/11	1.51 0.19	ND	ND	3.0 2.2
NJ: Trenton	04/15/11	1.51 0.19	ND	ND	ND
NM: Albuquerque	04/12/11	1.48 0.19	ND	ND	ND
NV: Las Vegas	04/13/11	1.53 0.19	ND	ND	ND
NV: Reno	04/18/11	1.55 0.20	ND	ND	ND
NY: Buffalo	04/13/11	1.51 0.20	ND	ND	ND
NY: Syracuse	04/13/11	1.51 0.19	ND	ND	ND
OH: Cincinnati	04/13/11	1.66 0.20	ND	ND	ND
OH: Cleveland	04/14/11	1.62 0.20	ND	ND	ND
OR: Portland	04/13/11	1.69 0.21	ND	ND	ND
PA: Pittsburgh	04/05/11	1.53 0.20	ND	ND	ND
TN: Athens	04/14/11	1.61 0.19	ND	ND	ND
TN: Knoxville	04/14/11	1.57 0.20	ND	ND	ND
TN: Memphis	04/11/11	1.53 0.19	ND	ND	4.0 2.4
TX: Dallas	04/12/11	1.55 0.20	ND	ND	ND
TX: San Antonio	04/19/11	1.45 0.19	ND	ND	ND
WA: Spokane	04/12/11	1.62 0.20	ND	ND	ND
WA: Tacoma	04/24/11	1.60 0.20	ND	ND	ND
WV: Charleston	04/13/11	1.50 0.19	ND	ND	ND

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:

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