

ENVIRONMENTAL

RADIATION

DATA

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April - June 2010

United States Environmental Protection Agency

Office of Radiation and Indoor Air

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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.

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 ³ | 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 ³ | 0.75 |
| | Water | pCi/L | 0.1 |
| † Uranium-234,235,238 | Air | aCi/m ³ | 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 ²³⁹Pu and ²⁴⁰Pu, 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 m³.

‡ Activity as of the day of counting.

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1. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation. 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 low background 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 beginning 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 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|-------------------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| AK: Anchorage | 9 | 0.0 | -0.0 | 0.0 | 0.004 | 0.001 | 0.002 |
| AK: Fairbanks | 5 | 0.1 | 0.0 | 0.0 | 0.006 | 0.002 | 0.004 |
| AL: Birmingham | 7 | 0.2 | 0.0 | 0.1 | 0.028 | 0.008 | 0.015 |
| AL: Montgomery/408 | 9 | 0.2 | 0.0 | 0.1 | 0.023 | 0.009 | 0.017 |
| AR: Little Rock | 8 | 0.2 | 0.0 | 0.1 | 0.015 | 0.005 | 0.011 |
| AZ: Phoenix/956 | 9 | 1.2 | 0.2 | 0.5 | 0.021 | 0.007 | 0.015 |
| AZ: Tucson | 8 | 0.0 | -0.0 | 0.0 | 0.009 | 0.004 | 0.007 |
| CA: Anaheim | 3 | 0.0 | 0.0 | 0.0 | 0.007 | 0.003 | 0.005 |
| CA: Bakersfield | 8 | 0.8 | -0.0 | 0.3 | 0.009 | 0.003 | 0.006 |
| CA: Eureka | 4 | 0.0 | -0.0 | 0.0 | 0.000 | 0.000 | 0.000 |
| CA: Fresno | 4 | 0.2 | 0.0 | 0.1 | 0.009 | 0.005 | 0.006 |
| CA: Los Angeles | 8 | 0.1 | 0.0 | 0.1 | 0.010 | 0.004 | 0.006 |
| CA: Richmond | 5 | 0.1 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| CA: Riverside | 8 | 0.0 | 0.0 | 0.0 | 0.010 | 0.001 | 0.006 |
| CA: Sacramento | 9 | 0.2 | 0.0 | 0.1 | 0.006 | 0.003 | 0.004 |
| CA: San Bernardino Cty. | 9 | 0.0 | 0.0 | 0.0 | 0.011 | 0.002 | 0.007 |
| CA: San Diego | 5 | 0.0 | 0.0 | 0.0 | 0.005 | 0.004 | 0.005 |
| CA: San Francisco | 4 | 0.0 | 0.0 | 0.0 | 0.003 | 0.002 | 0.003 |
| CA: San Jose | 5 | 0.0 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| CO: Colorado Springs | 4 | | | | 0.012 | 0.006 | 0.009 |
| CO: Denver | 9 | 0.5 | 0.0 | 0.3 | 0.013 | 0.004 | 0.007 |
| CO: Grand Junction | 7 | 0.4 | 0.0 | 0.2 | 0.015 | 0.004 | 0.009 |
| CT: Hartford | 9 | 0.1 | 0.0 | 0.0 | 0.010 | 0.001 | 0.006 |
| DC: Washington | 9 | 0.1 | 0.0 | 0.0 | 0.007 | 0.003 | 0.006 |
| DE: Dover | 7 | 0.1 | -0.0 | 0.0 | 0.012 | 0.004 | 0.006 |
| FL: Jacksonville | 9 | 0.1 | 0.0 | 0.0 | 0.013 | 0.005 | 0.009 |
| FL: Miami | 7 | 0.0 | 0.0 | 0.0 | 0.011 | 0.006 | 0.008 |
| FL: Orlando | 8 | 0.0 | 0.0 | 0.0 | 0.014 | 0.006 | 0.010 |
| FL: Tampa | 3 | 0.0 | 0.0 | 0.0 | 0.011 | 0.007 | 0.008 |
| GA: Atlanta | 4 | 0.0 | 0.0 | 0.0 | 0.016 | 0.010 | 0.012 |
| GA: Augusta | 4 | 0.2 | 0.1 | 0.2 | 0.020 | 0.009 | 0.014 |
| HI: Hilo | 9 | 0.0 | 0.0 | 0.0 | 0.006 | 0.002 | 0.004 |
| HI: Honolulu | 9 | 0.0 | 0.0 | 0.0 | 0.005 | 0.001 | 0.003 |
| IA: Des Moines | 7 | 0.4 | 0.0 | 0.2 | 0.010 | 0.005 | 0.008 |
| IA: Mason City | 2 | 0.7 | 0.3 | 0.5 | 0.014 | 0.008 | 0.011 |
| ID: Idaho Falls | 8 | 0.2 | 0.0 | 0.0 | 0.009 | 0.003 | 0.006 |
| IL: Aurora | 9 | 1.1 | 0.0 | 0.2 | 0.016 | 0.006 | 0.011 |
| IN: Fort Wayne | 3 | 0.0 | 0.0 | 0.0 | 0.012 | 0.011 | 0.011 |

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|--------------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| IN: Indianapolis | 9 | 0.3 | 0.0 | 0.1 | 0.012 | 0.006 | 0.009 |
| KS: Kansas City | 5 | 0.3 | 0.1 | 0.2 | 0.018 | 0.010 | 0.015 |
| KS: Topeka | 7 | 0.5 | 0.2 | 0.3 | 0.016 | 0.007 | 0.011 |
| KY: Lexington | 8 | 0.2 | 0.0 | 0.1 | 0.011 | 0.007 | 0.009 |
| LA: Baton Rouge | 8 | 0.3 | -0.1 | 0.1 | 0.012 | 0.005 | 0.009 |
| LA: Shreveport | 4 | 0.0 | 0.0 | 0.0 | 0.010 | 0.007 | 0.009 |
| MA: Worcester | 8 | 0.2 | 0.0 | 0.1 | 0.011 | 0.004 | 0.007 |
| MD: Baltimore | 7 | 0.1 | 0.0 | 0.0 | 0.010 | 0.006 | 0.008 |
| ME: Orono | 4 | 0.0 | 0.0 | 0.0 | 0.006 | 0.002 | 0.004 |
| ME: Portland | 7 | 0.0 | -0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| MI: Bay City 48708 | 8 | 0.1 | 0.0 | 0.1 | 0.012 | 0.004 | 0.008 |
| MI: Detroit | 9 | 0.1 | 0.0 | 0.1 | 0.012 | 0.004 | 0.008 |
| MN: Duluth | 7 | 0.1 | 0.0 | 0.0 | 0.009 | 0.004 | 0.006 |
| MN: St. Paul | 4 | 0.1 | 0.0 | 0.1 | 0.012 | 0.007 | 0.009 |
| MN: Welch/510 | 8 | 0.5 | 0.0 | 0.3 | 0.014 | 0.008 | 0.010 |
| MO: Jefferson City | 7 | 0.8 | 0.1 | 0.3 | 0.014 | 0.007 | 0.011 |
| MO: Springfield | 9 | 0.1 | 0.0 | 0.0 | 0.012 | 0.005 | 0.010 |
| MO: St. Louis | 3 | 0.1 | -0.1 | 0.0 | 0.010 | 0.008 | 0.009 |
| MS: Jackson | 4 | 0.6 | 0.0 | 0.2 | 0.014 | 0.011 | 0.012 |
| MS: Jackson/Deq | 9 | 0.4 | 0.1 | 0.2 | 0.014 | 0.006 | 0.010 |
| MT: Billings | 3 | 0.0 | 0.0 | 0.0 | 0.018 | 0.005 | 0.010 |
| NC: Charlotte | 4 | 0.1 | 0.0 | 0.1 | 0.011 | 0.006 | 0.009 |
| NC: Wilmington | 4 | | | | 0.009 | 0.007 | 0.008 |
| ND: Bismarck | 5 | 0.3 | 0.0 | 0.2 | 0.011 | 0.004 | 0.007 |
| NE: Kearney | 8 | 1.4 | 0.2 | 0.6 | 0.012 | 0.006 | 0.008 |
| NE: Lincoln | 9 | 0.7 | 0.1 | 0.4 | 0.017 | 0.005 | 0.010 |
| NE: Omaha | 3 | 0.0 | 0.0 | 0.0 | 0.012 | 0.010 | 0.011 |
| NH: Concord | 1 | | | | 0.011 | 0.011 | 0.011 |
| NJ: Edison | 8 | 0.1 | -0.0 | 0.0 | 0.010 | 0.002 | 0.005 |
| NJ: Trenton | 9 | 0.4 | 0.1 | 0.2 | 0.014 | 0.002 | 0.008 |
| NM: Carlsbad | 4 | | | | 0.011 | 0.006 | 0.008 |
| NM: Santa Fe | 6 | 0.9 | 0.0 | 0.2 | 0.012 | 0.005 | 0.008 |
| NV: Las Vegas/913 | 7 | 0.0 | 0.0 | 0.0 | 0.011 | 0.004 | 0.007 |
| NV: Reno | 8 | 0.2 | 0.0 | 0.1 | 0.011 | 0.002 | 0.006 |
| NY: Albany | 9 | 0.3 | 0.0 | 0.1 | 0.016 | 0.002 | 0.009 |
| NY: Hauppauge | 7 | 0.1 | 0.0 | 0.1 | 0.016 | 0.001 | 0.009 |
| NY: Rochester | 8 | 0.2 | 0.1 | 0.1 | 0.012 | 0.004 | 0.007 |
| NY: Yaphank | 9 | 0.0 | 0.0 | 0.0 | 0.010 | 0.001 | 0.004 |

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------------|-------------------|-----------------------|------------------------------|-----|-----------------------|------------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| OH: Cincinnati | 8 | 0.1 | 0.0 | 0.1 | 0.013 | 0.006 | 0.009 |
| OH: Cleveland | 8 | 0.0 | 0.0 | 0.0 | 0.010 | 0.004 | 0.007 |
| OH: Painesville | 4 | 0.1 | 0.0 | 0.1 | 0.011 | 0.004 | 0.007 |
| OH: Toledo | 1 | | | | 0.001 | 0.001 | 0.001 |
| OR: Portland | 8 | 0.1 | 0.0 | 0.0 | 0.013 | 0.001 | 0.007 |
| PA: Harrisburg | 8 | 0.6 | 0.2 | 0.3 | 0.023 | 0.006 | 0.014 |
| PA: Philadelphia | 5 | | | | 0.017 | 0.008 | 0.013 |
| PA: Pittsburgh | 6 | 0.2 | -0.0 | 0.1 | 0.012 | 0.004 | 0.008 |
| SC: Barnwell | 4 | 0.1 | 0.0 | 0.0 | 0.014 | 0.010 | 0.012 |
| SC: Columbia | 4 | 0.1 | 0.0 | 0.1 | 0.021 | 0.011 | 0.014 |
| SD: Pierre | 8 | 0.8 | 0.2 | 0.3 | 0.013 | 0.004 | 0.007 |
| TN: Knoxville | 1 | 0.1 | 0.1 | 0.1 | 0.007 | 0.007 | 0.007 |
| TN: Memphis | 7 | 0.0 | 0.0 | 0.0 | 0.015 | 0.006 | 0.012 |
| TN: Nashville | 2 | 0.0 | 0.0 | 0.0 | 0.012 | 0.006 | 0.009 |
| TN: Oak Ridge/Bethel | 8 | 0.7 | 0.1 | 0.3 | 0.016 | 0.009 | 0.012 |
| TN: Oak Ridge/K25 | 8 | 0.9 | 0.1 | 0.4 | 0.017 | 0.010 | 0.013 |
| TN: Oak Ridge/Melton | 7 | 0.5 | 0.1 | 0.3 | 0.017 | 0.009 | 0.012 |
| TN: Oak Ridge/Y12 E | 8 | 0.9 | 0.1 | 0.3 | 0.017 | 0.010 | 0.013 |
| TN: Oak Ridge/Y12 W | 8 | 0.4 | 0.1 | 0.2 | 0.017 | 0.010 | 0.013 |
| TX: Amarillo | 7 | 0.9 | 0.2 | 0.5 | 0.011 | 0.004 | 0.008 |
| TX: Austin | 7 | 0.3 | 0.1 | 0.2 | 0.015 | 0.007 | 0.010 |
| TX: Dallas | 8 | 0.5 | 0.1 | 0.2 | 0.014 | 0.006 | 0.010 |
| TX: El Paso | 9 | 1.1 | 0.3 | 0.7 | 0.015 | 0.007 | 0.011 |
| TX: Ft. Worth | 8 | 0.1 | 0.1 | 0.1 | 0.013 | 0.008 | 0.010 |
| TX: Houston | 8 | | | | 0.013 | 0.006 | 0.009 |
| TX: Laredo | 8 | 0.4 | 0.0 | 0.2 | 0.015 | 0.002 | 0.008 |
| TX: San Angelo | 9 | 0.1 | 0.0 | 0.0 | 0.016 | 0.002 | 0.008 |
| TX: San Antonio | 9 | 0.4 | 0.1 | 0.2 | 0.010 | 0.005 | 0.008 |
| UT: Salt Lake City | 9 | 0.1 | 0.0 | 0.1 | 0.015 | 0.004 | 0.009 |
| VA: Lynchburg | 9 | 0.8 | 0.2 | 0.5 | 0.015 | 0.006 | 0.011 |
| VA: Richmond | 9 | 0.0 | 0.0 | 0.0 | 0.009 | 0.005 | 0.007 |
| VA: Virginia Beach | 8 | 0.0 | 0.0 | 0.0 | 0.011 | 0.003 | 0.007 |
| WA: Olympia | 9 | 0.0 | 0.0 | 0.0 | 0.007 | 0.001 | 0.003 |
| WA: Richland | 4 | 0.1 | 0.0 | 0.1 | 0.005 | 0.002 | 0.003 |
| WA: Seattle | 6 | 0.0 | -0.0 | 0.0 | 0.005 | 0.002 | 0.004 |
| WA: Spokane | 8 | 0.1 | 0.0 | 0.0 | 0.011 | 0.002 | 0.006 |

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------|-------------------|-----------------------|------------------------------|-----|-----------------------|------------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| WI: Madison | 5 | 0.3 | 0.1 | 0.2 | 0.010 | 0.008 | 0.009 |
| WI: Milwaukee | 6 | 0.0 | 0.0 | 0.0 | 0.011 | 0.003 | 0.007 |
| WV: Charleston | 6 | 0.0 | 0.0 | 0.0 | 0.012 | 0.007 | 0.010 |

Table 3
Gross Beta in Airborne Particulates
May 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|-------------------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| AK: Anchorage | 8 | 0.0 | -0.0 | 0.0 | 0.003 | 0.001 | 0.002 |
| AK: Fairbanks | 6 | 0.1 | 0.0 | 0.0 | 0.006 | 0.003 | 0.004 |
| AL: Birmingham | 6 | 0.1 | 0.0 | 0.0 | 0.014 | 0.008 | 0.011 |
| AL: Montgomery/408 | 8 | 0.1 | 0.0 | 0.1 | 0.029 | 0.012 | 0.016 |
| AR: Little Rock | 7 | 0.1 | 0.0 | 0.0 | 0.013 | 0.007 | 0.010 |
| AZ: Phoenix | 1 | 0.2 | 0.2 | 0.2 | 0.009 | 0.009 | 0.009 |
| AZ: Phoenix/956 | 8 | 0.8 | 0.1 | 0.5 | 0.020 | 0.008 | 0.015 |
| AZ: Tucson | 8 | 0.4 | -0.0 | 0.1 | 0.008 | 0.003 | 0.006 |
| CA: Anaheim | 4 | 0.0 | 0.0 | 0.0 | 0.006 | 0.003 | 0.004 |
| CA: Bakersfield | 7 | 0.4 | 0.1 | 0.3 | 0.011 | 0.003 | 0.006 |
| CA: Eureka | 4 | 0.0 | -0.0 | 0.0 | 0.000 | 0.000 | 0.000 |
| CA: Fresno | 3 | 0.1 | 0.0 | 0.1 | 0.007 | 0.003 | 0.005 |
| CA: Los Angeles | 7 | 0.1 | 0.0 | 0.0 | 0.009 | 0.003 | 0.005 |
| CA: Richmond | 4 | 0.1 | 0.0 | 0.1 | 0.005 | 0.002 | 0.003 |
| CA: Riverside | 8 | 0.0 | 0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| CA: Sacramento | 8 | 0.2 | 0.0 | 0.1 | 0.007 | 0.002 | 0.004 |
| CA: San Bernardino Cty. | 7 | 0.0 | 0.0 | 0.0 | 0.012 | 0.004 | 0.007 |
| CA: San Diego | 5 | 0.0 | 0.0 | 0.0 | 0.006 | 0.003 | 0.004 |
| CA: San Francisco | 4 | 0.0 | 0.0 | 0.0 | 0.004 | 0.002 | 0.002 |
| CA: San Jose | 4 | 0.0 | 0.0 | 0.0 | 0.006 | 0.003 | 0.004 |
| CO: Colorado Springs | 3 | | | | 0.010 | 0.007 | 0.008 |
| CO: Denver | 7 | 0.4 | 0.1 | 0.2 | 0.009 | 0.003 | 0.007 |
| CO: Grand Junction | 4 | 0.3 | 0.3 | 0.3 | 0.011 | 0.003 | 0.008 |
| CT: Hartford | 6 | 0.1 | 0.0 | 0.0 | 0.008 | 0.003 | 0.005 |
| DC: Washington | 7 | 0.1 | 0.0 | 0.0 | 0.012 | 0.005 | 0.007 |
| DE: Dover | 6 | 0.1 | 0.0 | 0.0 | 0.009 | 0.003 | 0.006 |
| FL: Jacksonville | 7 | 0.0 | 0.0 | 0.0 | 0.010 | 0.006 | 0.007 |
| FL: Miami | 5 | 0.0 | 0.0 | 0.0 | 0.010 | 0.004 | 0.007 |
| FL: Orlando | 7 | 0.1 | 0.0 | 0.0 | 0.013 | 0.007 | 0.010 |
| FL: Tallahassee | 2 | 0.1 | 0.0 | 0.1 | 0.009 | 0.008 | 0.009 |
| GA: Atlanta | 3 | 0.0 | 0.0 | 0.0 | 0.008 | 0.007 | 0.008 |
| GA: Augusta | 4 | 0.2 | 0.1 | 0.1 | 0.015 | 0.010 | 0.012 |
| HI: Hilo | 8 | 0.0 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| HI: Honolulu | 8 | 0.1 | 0.0 | 0.0 | 0.010 | 0.002 | 0.004 |
| IA: Des Moines | 8 | 0.2 | 0.0 | 0.1 | 0.007 | 0.002 | 0.005 |
| IA: Mason City | 4 | 0.4 | 0.1 | 0.2 | 0.008 | 0.006 | 0.007 |
| ID: Idaho Falls | 4 | 0.1 | 0.0 | 0.1 | 0.009 | 0.005 | 0.006 |
| IL: Aurora | 8 | 0.4 | 0.1 | 0.2 | 0.013 | 0.005 | 0.009 |

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|-------------------------|-------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| IN: Indianapolis | 8 | 0.1 | 0.0 | 0.0 | 0.007 | 0.004 | 0.006 |
| KS: Kansas City | 7 | 0.2 | 0.0 | 0.1 | 0.009 | 0.002 | 0.006 |
| KS: Topeka | 9 | 0.4 | 0.0 | 0.2 | 0.018 | 0.003 | 0.009 |
| KS: Wichita | 3 | 0.1 | 0.0 | 0.1 | 0.009 | 0.003 | 0.007 |
| KY: Lexington | 6 | 0.0 | 0.0 | 0.0 | 0.008 | 0.006 | 0.007 |
| KY: Louisville | 4 | 0.5 | 0.0 | 0.2 | 0.008 | 0.007 | 0.007 |
| LA: Baton Rouge | 8 | 0.3 | 0.0 | 0.1 | 0.009 | 0.004 | 0.007 |
| LA: Shreveport | 4 | 0.0 | 0.0 | 0.0 | 0.008 | 0.004 | 0.006 |
| MA: Worcester | 4 | 0.1 | 0.0 | 0.0 | 0.009 | 0.005 | 0.007 |
| MD: Baltimore | 7 | 0.1 | 0.0 | 0.1 | 0.011 | 0.004 | 0.008 |
| ME: Orono | 4 | 0.0 | 0.0 | 0.0 | 0.008 | 0.004 | 0.006 |
| ME: Portland | 7 | 0.0 | -0.0 | 0.0 | 0.019 | 0.003 | 0.007 |
| MI: Bay City 48708 | 6 | 0.1 | 0.0 | 0.0 | 0.011 | 0.004 | 0.007 |
| MI: Detroit | 8 | 0.1 | 0.0 | 0.1 | 0.009 | 0.003 | 0.006 |
| MN: Duluth | 4 | 0.1 | 0.1 | 0.1 | 0.008 | 0.005 | 0.006 |
| MN: St. Paul | 4 | 0.5 | 0.0 | 0.2 | 0.008 | 0.006 | 0.007 |
| MN: Welch/510 | 7 | 0.3 | 0.0 | 0.2 | 0.009 | 0.005 | 0.007 |
| MO: Jefferson City | 8 | 0.3 | 0.0 | 0.1 | 0.011 | 0.006 | 0.008 |
| MO: Springfield | 7 | 0.1 | 0.0 | 0.0 | 0.010 | 0.005 | 0.007 |
| MO: St. Louis | 2 | -0.0 | -0.0 | -0.0 | 0.008 | 0.006 | 0.007 |
| MS: Jackson | 4 | 0.2 | 0.0 | 0.1 | 0.012 | 0.008 | 0.010 |
| MS: Jackson/Deq | 8 | 0.4 | 0.1 | 0.2 | 0.013 | 0.007 | 0.009 |
| MT: Billings | 3 | 0.0 | 0.0 | 0.0 | 0.012 | 0.006 | 0.009 |
| NC: Charlotte | 8 | 0.1 | 0.0 | 0.0 | 0.011 | 0.005 | 0.008 |
| NC: Wilmington | 4 | | | | 0.010 | 0.006 | 0.008 |
| ND: Bismarck | 5 | 0.1 | 0.0 | 0.0 | 0.008 | 0.001 | 0.005 |
| NE: Kearney | 8 | 0.5 | 0.1 | 0.2 | 0.010 | 0.001 | 0.007 |
| NE: Lincoln | 5 | 0.3 | 0.1 | 0.2 | 0.008 | 0.003 | 0.006 |
| NE: Omaha | 4 | 0.0 | 0.0 | 0.0 | 0.006 | 0.005 | 0.006 |
| NJ: Edison | 6 | 0.0 | -0.0 | 0.0 | 0.008 | 0.003 | 0.005 |
| NJ: Trenton | 6 | 0.3 | 0.1 | 0.2 | 0.012 | 0.003 | 0.008 |
| NM: Albuquerque | 3 | 0.3 | 0.0 | 0.1 | 0.008 | 0.006 | 0.007 |
| NM: Carlsbad | 4 | | | | 0.011 | 0.008 | 0.009 |
| NM: Navajo Lake St Park | 3 | 0.4 | 0.0 | 0.2 | 0.010 | 0.006 | 0.008 |
| NM: Santa Fe | 5 | 0.7 | 0.0 | 0.1 | 0.008 | 0.005 | 0.006 |
| NV: Las Vegas/913 | 7 | 0.0 | 0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| NV: Reno | 6 | 0.4 | 0.1 | 0.2 | 0.008 | 0.003 | 0.005 |
| NY: Albany | 7 | 0.2 | 0.0 | 0.1 | 0.013 | 0.004 | 0.008 |

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| NY: Hauppauge | 8 | 0.1 | 0.0 | 0.0 | 0.016 | 0.005 | 0.010 |
| NY: Rochester | 8 | 0.2 | 0.0 | 0.1 | 0.009 | 0.003 | 0.006 |
| NY: Yaphank | 8 | 0.0 | 0.0 | 0.0 | 0.007 | 0.002 | 0.004 |
| OH: Cincinnati | 8 | 0.1 | 0.0 | 0.0 | 0.008 | 0.005 | 0.006 |
| OH: Cleveland | 8 | 0.1 | 0.0 | 0.0 | 0.007 | 0.003 | 0.005 |
| OH: Painesville | 7 | 0.1 | 0.0 | 0.0 | 0.008 | 0.005 | 0.006 |
| OH: Toledo | 3 | | | | 0.001 | 0.000 | 0.001 |
| OR: Portland | 6 | 0.1 | 0.0 | 0.0 | 0.017 | 0.004 | 0.008 |
| PA: Harrisburg | 4 | 0.2 | 0.0 | 0.1 | 0.017 | 0.011 | 0.014 |
| PA: Philadelphia | 2 | | | | 0.019 | 0.011 | 0.015 |
| PA: Pittsburgh | 6 | 0.1 | 0.0 | 0.0 | 0.007 | 0.005 | 0.005 |
| SC: Barnwell | 2 | 0.0 | 0.0 | 0.0 | 0.011 | 0.008 | 0.009 |
| SC: Columbia | 3 | 0.1 | 0.0 | 0.0 | 0.013 | 0.010 | 0.012 |
| SD: Pierre | 7 | 0.3 | 0.1 | 0.3 | 0.009 | 0.002 | 0.005 |
| TN: Knoxville | 3 | 0.1 | 0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| TN: Memphis | 6 | 0.0 | 0.0 | 0.0 | 0.013 | 0.009 | 0.010 |
| TN: Nashville | 3 | 0.0 | 0.0 | 0.0 | 0.006 | 0.005 | 0.005 |
| TN: Oak Ridge/Bethel | 8 | 0.5 | 0.1 | 0.2 | 0.012 | 0.007 | 0.009 |
| TN: Oak Ridge/K25 | 8 | 0.7 | 0.1 | 0.4 | 0.012 | 0.005 | 0.010 |
| TN: Oak Ridge/Melton | 8 | 0.5 | 0.1 | 0.3 | 0.012 | 0.007 | 0.009 |
| TN: Oak Ridge/Y12 E | 8 | 0.6 | 0.0 | 0.2 | 0.012 | 0.006 | 0.010 |
| TN: Oak Ridge/Y12 W | 8 | 0.3 | 0.0 | 0.1 | 0.011 | 0.008 | 0.009 |
| TX: Amarillo | 8 | 1.1 | 0.3 | 0.6 | 0.011 | 0.005 | 0.007 |
| TX: Austin | 4 | 0.3 | 0.0 | 0.1 | 0.013 | 0.008 | 0.011 |
| TX: Dallas | 5 | 0.3 | 0.1 | 0.2 | 0.012 | 0.007 | 0.009 |
| TX: El Paso | 8 | 1.0 | 0.3 | 0.7 | 0.015 | 0.008 | 0.011 |
| TX: Ft. Worth | 6 | 0.1 | 0.1 | 0.1 | 0.011 | 0.008 | 0.009 |
| TX: Houston | 7 | | | | 0.014 | 0.006 | 0.009 |
| TX: Laredo | 4 | 0.4 | 0.1 | 0.2 | 0.010 | 0.004 | 0.007 |
| TX: San Angelo | 8 | 0.1 | 0.0 | 0.0 | 0.012 | 0.004 | 0.008 |
| TX: San Antonio | 9 | 0.4 | 0.1 | 0.2 | 0.014 | 0.005 | 0.008 |
| UT: Salt Lake City | 6 | 0.2 | 0.0 | 0.1 | 0.011 | 0.003 | 0.007 |
| VA: Harrisonburg | 3 | 0.4 | 0.3 | 0.4 | 0.009 | 0.008 | 0.008 |
| VA: Lynchburg | 6 | 0.7 | 0.1 | 0.3 | 0.011 | 0.007 | 0.009 |
| VA: Richmond | 7 | 0.0 | 0.0 | 0.0 | 0.009 | 0.002 | 0.006 |
| VA: Virginia Beach | 3 | 0.1 | 0.0 | 0.0 | 0.014 | 0.008 | 0.010 |
| WA: Olympia | 8 | 0.0 | 0.0 | 0.0 | 0.006 | 0.001 | 0.003 |
| WA: Seattle | 5 | 0.0 | 0.0 | 0.0 | 0.005 | 0.001 | 0.003 |

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| WA: Spokane | 8 | 0.2 | 0.0 | 0.1 | 0.015 | 0.003 | 0.007 |
| WI: Madison | 7 | 0.3 | 0.1 | 0.2 | 0.011 | 0.005 | 0.008 |
| WI: Milwaukee | 7 | 0.0 | 0.0 | 0.0 | 0.008 | 0.003 | 0.005 |
| WV: Charleston | 6 | 0.0 | 0.0 | 0.0 | 0.009 | 0.006 | 0.007 |

Table 4
Gross Beta in Airborne Particulates
June 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|-------------------------|-------------------|-----------------------|---------------------------|-----|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| AK: Anchorage | 8 | 0.0 | -0.0 | 0.0 | 0.005 | 0.001 | 0.002 |
| AK: Fairbanks | 7 | 0.1 | 0.0 | 0.0 | 0.008 | 0.001 | 0.004 |
| AL: Birmingham | 6 | 0.1 | 0.0 | 0.1 | 0.023 | 0.004 | 0.013 |
| AL: Montgomery/408 | 9 | 0.5 | 0.0 | 0.1 | 0.038 | 0.002 | 0.015 |
| AR: Little Rock | 8 | 0.2 | 0.0 | 0.1 | 0.017 | 0.008 | 0.011 |
| AZ: Phoenix | 5 | 1.5 | 0.2 | 0.8 | 0.013 | 0.011 | 0.012 |
| AZ: Phoenix/956 | 8 | 0.8 | 0.3 | 0.5 | 0.024 | 0.010 | 0.015 |
| AZ: Tucson | 9 | 0.0 | 0.0 | 0.0 | 0.009 | 0.006 | 0.007 |
| CA: Anaheim | 5 | 0.0 | 0.0 | 0.0 | 0.008 | 0.004 | 0.005 |
| CA: Bakersfield | 9 | 0.5 | 0.1 | 0.3 | 0.013 | 0.004 | 0.006 |
| CA: Eureka | 5 | 0.0 | 0.0 | 0.0 | 0.003 | 0.000 | 0.001 |
| CA: Los Angeles | 9 | 0.1 | 0.0 | 0.1 | 0.009 | 0.005 | 0.007 |
| CA: Richmond | 5 | 0.0 | 0.0 | 0.0 | 0.002 | 0.001 | 0.002 |
| CA: Riverside | 8 | 0.0 | 0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| CA: Sacramento | 9 | 0.4 | 0.1 | 0.2 | 0.004 | 0.002 | 0.003 |
| CA: San Bernardino Cty. | 9 | 0.0 | 0.0 | 0.0 | 0.010 | 0.005 | 0.008 |
| CA: San Diego | 5 | 0.0 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| CA: San Francisco | 3 | 0.0 | 0.0 | 0.0 | 0.003 | 0.002 | 0.002 |
| CA: San Jose | 4 | 0.1 | 0.0 | 0.0 | 0.003 | 0.002 | 0.003 |
| CO: Colorado Springs | 5 | | | | 0.011 | 0.007 | 0.009 |
| CO: Denver | 8 | 0.7 | 0.1 | 0.4 | 0.011 | 0.006 | 0.009 |
| CO: Grand Junction | 6 | | | | 0.012 | 0.006 | 0.009 |
| CT: Hartford | 9 | 0.1 | 0.0 | 0.0 | 0.008 | 0.002 | 0.006 |
| DC: Washington | 8 | 0.1 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| DE: Dover | 7 | 0.2 | 0.0 | 0.0 | 0.009 | 0.005 | 0.007 |
| FL: Jacksonville | 8 | 0.0 | 0.0 | 0.0 | 0.014 | 0.004 | 0.008 |
| FL: Miami | 4 | 0.0 | 0.0 | 0.0 | 0.009 | 0.002 | 0.005 |
| FL: Orlando | 5 | 0.1 | 0.0 | 0.0 | 0.011 | 0.006 | 0.009 |
| FL: Tallahassee | 5 | 0.0 | 0.0 | 0.0 | 0.007 | 0.004 | 0.006 |
| FL: Tampa | 4 | 0.0 | 0.0 | 0.0 | 0.009 | 0.005 | 0.007 |
| GA: Atlanta | 1 | 0.0 | 0.0 | 0.0 | 0.008 | 0.008 | 0.008 |
| GA: Augusta | 5 | 0.3 | 0.1 | 0.2 | 0.014 | 0.008 | 0.011 |
| HI: Hilo | 9 | 0.1 | 0.0 | 0.0 | 0.008 | 0.001 | 0.004 |
| HI: Honolulu | 9 | 0.0 | 0.0 | 0.0 | 0.013 | 0.001 | 0.004 |
| IA: Des Moines | 9 | 0.3 | 0.0 | 0.1 | 0.007 | 0.004 | 0.006 |
| IA: Mason City | 4 | 0.3 | 0.1 | 0.2 | 0.007 | 0.004 | 0.006 |
| ID: Idaho Falls | 9 | 0.1 | 0.0 | 0.0 | 0.010 | 0.003 | 0.006 |
| IL: Aurora | 8 | 0.4 | 0.0 | 0.2 | 0.016 | 0.006 | 0.011 |

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|-------------------------|-------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| IN: Indianapolis | 9 | 0.1 | 0.0 | 0.0 | 0.010 | 0.003 | 0.007 |
| KS: Kansas City | 9 | 0.2 | 0.0 | 0.1 | 0.012 | 0.003 | 0.008 |
| KS: Topeka | 6 | 0.3 | 0.1 | 0.1 | 0.011 | 0.006 | 0.009 |
| KS: Wichita | 8 | 0.7 | 0.0 | 0.3 | 0.016 | 0.006 | 0.011 |
| KY: Lexington | 7 | 0.1 | 0.0 | 0.0 | 0.011 | 0.004 | 0.008 |
| KY: Louisville | 8 | 0.3 | 0.0 | 0.1 | 0.014 | 0.006 | 0.010 |
| LA: Baton Rouge | 8 | 0.2 | 0.1 | 0.1 | 0.011 | 0.004 | 0.006 |
| LA: Shreveport | 7 | 0.2 | 0.0 | 0.1 | 0.015 | 0.004 | 0.009 |
| MA: Worcester | 7 | 0.1 | 0.0 | 0.0 | 0.017 | 0.003 | 0.008 |
| MD: Baltimore | 9 | 1.0 | 0.0 | 0.2 | 0.013 | 0.007 | 0.010 |
| ME: Orono | 5 | 0.0 | 0.0 | 0.0 | 0.006 | 0.003 | 0.005 |
| ME: Portland | 8 | 0.0 | 0.0 | 0.0 | 0.008 | 0.004 | 0.005 |
| MI: Bay City 48708 | 6 | 0.3 | 0.0 | 0.1 | 0.007 | 0.005 | 0.006 |
| MI: Detroit | 8 | 0.1 | 0.0 | 0.1 | 0.008 | 0.005 | 0.006 |
| MN: Duluth | 6 | 0.1 | 0.0 | 0.0 | 0.009 | 0.003 | 0.004 |
| MN: St. Paul | 5 | 0.1 | 0.0 | 0.0 | 0.006 | 0.002 | 0.004 |
| MN: Welch/510 | 6 | 0.0 | 0.0 | 0.0 | 0.014 | 0.001 | 0.005 |
| MO: Jefferson City | 8 | 0.3 | 0.1 | 0.2 | 0.012 | 0.006 | 0.008 |
| MO: Springfield | 9 | 0.2 | 0.0 | 0.1 | 0.016 | 0.006 | 0.009 |
| MO: St. Louis | 1 | -0.1 | -0.1 | -0.1 | 0.008 | 0.008 | 0.008 |
| MS: Jackson | 2 | 0.1 | 0.0 | 0.1 | 0.012 | 0.010 | 0.011 |
| MS: Jackson/Deq | 4 | 0.3 | 0.1 | 0.2 | 0.013 | 0.009 | 0.011 |
| MT: Billings | 3 | 0.0 | 0.0 | 0.0 | 0.010 | 0.006 | 0.007 |
| NC: Charlotte | 9 | 0.2 | 0.0 | 0.1 | 0.011 | 0.006 | 0.009 |
| NC: Wilmington | 2 | | | | 0.008 | 0.007 | 0.007 |
| ND: Bismarck | 8 | 0.1 | -0.0 | 0.1 | 0.007 | 0.002 | 0.005 |
| NE: Kearney | 5 | 0.4 | 0.0 | 0.2 | 0.008 | 0.004 | 0.006 |
| NE: Lincoln | 8 | 0.3 | 0.0 | 0.2 | 0.015 | 0.004 | 0.007 |
| NE: Omaha | 6 | 0.0 | 0.0 | 0.0 | 0.008 | 0.005 | 0.006 |
| NJ: Edison | 9 | 0.1 | -0.0 | 0.0 | 0.016 | 0.003 | 0.007 |
| NJ: Trenton | 9 | 0.5 | 0.1 | 0.3 | 0.013 | 0.007 | 0.009 |
| NM: Albuquerque | 5 | 0.4 | 0.0 | 0.2 | 0.007 | 0.005 | 0.006 |
| NM: Carlsbad | 5 | | | | 0.014 | 0.007 | 0.010 |
| NM: Navajo Lake St Park | 4 | 0.1 | 0.1 | 0.1 | 0.007 | 0.004 | 0.006 |
| NM: Santa Fe | 5 | 0.3 | 0.0 | 0.1 | 0.011 | 0.006 | 0.009 |
| NV: Las Vegas/913 | 7 | 0.0 | 0.0 | 0.0 | 0.012 | 0.004 | 0.007 |
| NV: Reno | 7 | 0.2 | -0.0 | 0.1 | 0.013 | 0.002 | 0.006 |
| NY: Albany | 9 | 0.2 | 0.0 | 0.1 | 0.011 | 0.004 | 0.008 |

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------------|-------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| NY: Hauppauge | 8 | 0.1 | 0.0 | 0.1 | 0.011 | 0.006 | 0.009 |
| NY: Lockport | 5 | 0.0 | -0.0 | 0.0 | 0.021 | 0.005 | 0.011 |
| NY: Rochester | 7 | 0.2 | 0.0 | 0.1 | 0.010 | 0.004 | 0.007 |
| NY: Yaphank | 5 | 0.0 | 0.0 | 0.0 | 0.005 | 0.003 | 0.004 |
| OH: Cincinnati | 9 | 0.2 | 0.0 | 0.1 | 0.013 | 0.006 | 0.010 |
| OH: Cleveland | 7 | 0.1 | -0.0 | 0.0 | 0.009 | 0.005 | 0.006 |
| OH: Painesville | 7 | 0.1 | 0.0 | 0.1 | 0.011 | 0.006 | 0.008 |
| OH: Toledo | 6 | -0.1 | -0.1 | -0.1 | 0.012 | 0.001 | 0.009 |
| OR: Portland | 8 | 0.0 | 0.0 | 0.0 | 0.007 | 0.003 | 0.005 |
| PA: Harrisburg | 4 | 0.3 | 0.1 | 0.2 | 0.025 | 0.016 | 0.019 |
| PA: Pittsburgh | 5 | 0.1 | 0.0 | 0.1 | 0.008 | 0.005 | 0.007 |
| SC: Barnwell | 2 | 0.1 | 0.0 | 0.0 | 0.009 | 0.009 | 0.009 |
| SC: Columbia | 5 | 0.1 | 0.0 | 0.0 | 0.027 | 0.009 | 0.014 |
| SD: Pierre | 8 | 0.5 | 0.0 | 0.3 | 0.009 | 0.003 | 0.006 |
| TN: Knoxville | 2 | 0.2 | 0.2 | 0.2 | 0.016 | 0.009 | 0.013 |
| TN: Memphis | 7 | 0.0 | 0.0 | 0.0 | 0.012 | 0.008 | 0.011 |
| TN: Nashville | 4 | 0.0 | 0.0 | 0.0 | 0.008 | 0.005 | 0.006 |
| TN: Oak Ridge/Bethel | 8 | 0.6 | 0.1 | 0.3 | 0.016 | 0.004 | 0.011 |
| TN: Oak Ridge/K25 | 8 | 0.8 | 0.2 | 0.4 | 0.017 | 0.006 | 0.012 |
| TN: Oak Ridge/Melton | 8 | 0.7 | 0.1 | 0.3 | 0.014 | 0.011 | 0.012 |
| TN: Oak Ridge/Y12 E | 8 | 0.8 | 0.1 | 0.3 | 0.014 | 0.007 | 0.012 |
| TN: Oak Ridge/Y12 W | 8 | 0.4 | 0.1 | 0.2 | 0.014 | 0.007 | 0.013 |
| TX: Amarillo | 7 | 1.2 | 0.4 | 0.7 | 0.011 | 0.005 | 0.008 |
| TX: Austin | 5 | 0.2 | -0.0 | 0.1 | 0.013 | 0.007 | 0.010 |
| TX: Dallas | 6 | 0.4 | 0.1 | 0.2 | 0.013 | 0.005 | 0.009 |
| TX: El Paso | 9 | 1.1 | 0.3 | 0.7 | 0.014 | 0.008 | 0.013 |
| TX: Ft. Worth | 7 | 0.1 | 0.1 | 0.1 | 0.016 | 0.007 | 0.011 |
| TX: Houston | 8 | | | | 0.023 | 0.003 | 0.011 |
| TX: Laredo | 2 | 0.3 | 0.0 | 0.2 | 0.008 | 0.003 | 0.006 |
| TX: San Angelo | 9 | 0.1 | 0.0 | 0.0 | 0.011 | 0.004 | 0.007 |
| TX: San Antonio | 7 | 0.3 | 0.0 | 0.2 | 0.010 | 0.004 | 0.007 |
| UT: Salt Lake City | 9 | 0.2 | 0.0 | 0.1 | 0.012 | 0.005 | 0.008 |
| VA: Harrisonburg | 9 | 1.5 | 0.0 | 0.6 | 0.028 | 0.006 | 0.015 |
| VA: Lynchburg | 9 | 0.9 | 0.1 | 0.5 | 0.013 | 0.007 | 0.010 |
| VA: Richmond | 8 | 0.1 | 0.0 | 0.0 | 0.007 | 0.005 | 0.006 |
| WA: Olympia | 8 | 0.0 | 0.0 | 0.0 | 0.003 | 0.001 | 0.002 |
| WA: Seattle | 6 | 0.0 | 0.0 | 0.0 | 0.003 | 0.002 | 0.002 |
| WA: Spokane | 9 | 0.2 | 0.0 | 0.1 | 0.008 | 0.003 | 0.005 |

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2010

| Location | Number of Samples | 5-hour Field Estimate | | | NAREL Lab Measurement | | |
|----------------|-------------------|-----------------------|------------------------------|-----|-----------------------|------------------------------|-------|
| | | Max | Min (pCi/m ³) | Avg | Max | Min (pCi/m ³) | Avg |
| WI: Madison | 7 | 0.3 | 0.1 | 0.1 | 0.008 | 0.003 | 0.006 |
| WI: Milwaukee | 7 | 0.1 | 0.0 | 0.0 | 0.010 | 0.004 | 0.006 |
| WV: Charleston | 6 | 0.0 | 0.0 | 0.0 | 0.011 | 0.006 | 0.009 |

Table 5
Specific Gamma in Precipitation
April 2010

| Location | Nuclide | pCi/L \pm 2 σ | |
|----------------------|---------|------------------------|------|
| AL: Montgomery/408 | | ND | |
| AR: Little Rock | | ND | |
| CA: Richmond | Be7 | 57 | 48 |
| CO: Denver | Tl208 | 1.3 | 1.3 |
| CT: Hartford | Be7 | 34 | 35 |
| FL: Jacksonville | Pb212 | 3.9 | 5.5 |
| ID: Idaho Falls | Pb212 | 5.2 | 6.5 |
| KS: Kansas City | Be7 | 26 | 26 |
| MI: Lansing | | ND | |
| MN: St. Paul | Tl208 | 0.67 | 0.94 |
| MN: Welch/510 | | ND | |
| NC: Charlotte | | ND | |
| NC: Wilmington | | ND | |
| NY: Albany | Tl208 | 1.4 | 1.5 |
| NY: Yaphank | | ND | |
| OH: Painesville | K40 | 31 | 34 |
| OR: Portland | | ND | |
| PA: Harrisburg | | ND | |
| TN: Nashville | K40 | 18 | 33 |
| TN: Oak Ridge/K25 | Pb212 | 1.6 | 2.1 |
| TN: Oak Ridge/Melton | | ND | |
| TN: Oak Ridge/Y12 E | | ND | |
| TX: Austin | Tl208 | 3.6 | 3.8 |
| UT: Salt Lake City | | ND | |
| VA: Lynchburg | K40 | 24 | 42 |
| WA: Olympia | Be7 | 55 | 41 |

Table 6
Specific Gamma in Precipitation
May 2010

| Location | Nuclide | pCi/L \pm 2 <i>u</i> | |
|----------------------|---------|------------------------|-----|
| AL: Montgomery/408 | | ND | |
| AR: Little Rock | K40 | 10 | 12 |
| CA: Richmond | Pb212 | 4.9 | 4.7 |
| CO: Denver | | ND | |
| CT: Hartford | Be7 | 39 | 29 |
| FL: Jacksonville | | ND | |
| GA: Atlanta | K40 | 39 | 31 |
| ID: Idaho Falls | Tl208 | 4.0 | 4.7 |
| KS: Kansas City | Be7 | 79 | 37 |
| | Pb212 | 2.3 | 2.8 |
| | Tl208 | 1.5 | 1.4 |
| | K40 | 119 | 25 |
| | Pb212 | 8.4 | 3.1 |
| | Ra228 | 10.3 | 4.4 |
| | Tl208 | 4.2 | 2.2 |
| MI: Lansing | | ND | |
| MN: St. Paul | Tl208 | 1.8 | 1.4 |
| | Tl208 | 1.3 | 1.5 |
| MN: Welch/510 | Pb212 | 2.4 | 2.8 |
| NC: Charlotte | Be7 | 43 | 36 |
| NC: Wilmington | | ND | |
| NY: Albany | | ND | |
| NY: Yaphank | | ND | |
| OH: Painesville | Be7 | 72 | 33 |
| OR: Portland | | ND | |
| PA: Harrisburg | | ND | |
| TN: Nashville | | ND | |
| TN: Oak Ridge/K25 | Tl208 | 1.1 | 1.3 |
| TN: Oak Ridge/Melton | | ND | |
| TN: Oak Ridge/Y12 E | | ND | |
| UT: Salt Lake City | Be7 | 30 | 32 |
| VA: Lynchburg | | ND | |
| WA: Olympia | | ND | |

Table 7
Specific Gamma in Precipitation
June 2010

| Location | Nuclide | pCi/L \pm 2 σ | |
|----------------------|---------|------------------------|------|
| AL: Montgomery/408 | Be7 | 46 | 30 |
| AR: Little Rock | Pb212 | 2.2 | 2.8 |
| | Tl208 | 1.1 | 1.4 |
| CA: Richmond | | ND | |
| CO: Denver | | ND | |
| CT: Hartford | Be7 | 47 | 31 |
| | Tl208 | 1.2 | 1.2 |
| FL: Jacksonville | Be7 | 38 | 27 |
| | K40 | 9 | 12 |
| | Be7 | 90 | 43 |
| GA: Atlanta | | | |
| ID: Idaho Falls | | ND | |
| KS: Kansas City | | ND | |
| MI: Lansing | | ND | |
| MN: St. Paul | Be7 | 24 | 16 |
| | Tl208 | 0.89 | 0.96 |
| NC: Charlotte | Be7 | 40 | 25 |
| | Pb212 | 3.1 | 2.7 |
| | Tl208 | 1.4 | 1.3 |
| | Be7 | 19 | 12 |
| NC: Wilmington | Pb212 | 1.7 | 1.1 |
| | Tl208 | 0.75 | 0.69 |
| | Be7 | 37 | 18 |
| NY: Albany | Bi212 | 12 | 13 |
| | Tl208 | 1.8 | 1.6 |
| | K40 | 16 | 12 |
| | Pb212 | 1.6 | 2.5 |
| NY: Yaphank | Tl208 | 1.0 | 1.4 |
| | Tl208 | 1.3 | 1.9 |
| | Be7 | 48 | 22 |
| OH: Painesville | | | |
| OR: Portland | | ND | |
| PA: Harrisburg | Be7 | 87 | 54 |
| TN: Nashville | | ND | |
| TN: Oak Ridge/K25 | Be7 | 71 | 28 |
| | Tl208 | 1.1 | 1.3 |
| TN: Oak Ridge/Melton | | ND | |
| TN: Oak Ridge/Y12 E | Be7 | 42 | 24 |
| UT: Salt Lake City | Be7 | 35 | 25 |

Table 7 (continued)
Specific Gamma in Precipitation
June 2010

| Location | Nuclide | pCi/L $\pm 2u$ | |
|--------------------|---------|----------------|-----|
| UT: Salt Lake City | Pb212 | 2.0 | 2.7 |
| | Tl208 | 0.9 | 1.3 |
| VA: Lynchburg | Pb212 | 7.3 | 6.6 |
| | K40 | 23 | 29 |
| WA: Olympia | Be7 | 26 | 23 |

Table 8
Tritium in Precipitation
April - June 2010

| Location | April 2010 pCi/L ± 2u | May 2010 pCi/L ± 2u | June 2010 pCi/L ± 2u |
|----------------------|--------------------------|------------------------|-------------------------|
| AL: Montgomery/408 | 29 77 | -114 92 | -64 84 |
| AR: Little Rock | -7 88 | 226 90 | -15 85 |
| CA: Richmond | -10 97 | 104 83 | -49 83 |
| CO: Denver | 95 93 | 27 79 | -45 84 |
| CT: Hartford | 11 80 | -70 95 | 8 87 |
| FL: Jacksonville | 2 79 | 61 90 | -89 82 |
| GA: Atlanta | NS | -52 96 | -6 86 |
| ID: Idaho Falls | -80 94 | 81 82 | -32 84 |
| KS: Kansas City | 77 92 | 138 85 | -68 83 |
| MI: Lansing | -22 97 | 89 83 | 67 89 |
| MN: St. Paul | 70 92 | 93 83 | -81 83 |
| MN: Welch/510 | -7 89 | 117 85 | NS |
| NC: Charlotte | 4 79 | -56 95 | -15 85 |
| NC: Wilmington | 13 80 | -112 92 | -19 86 |
| NY: Albany | 60 82 | -62 94 | 57 89 |
| NY: Yaphank | 90 83 | -99 92 | -6 86 |
| OH: Painesville | 83 92 | 144 85 | 36 88 |
| OR: Portland | -18 95 | 40 80 | -27 83 |
| PA: Harrisburg | -11 79 | -24 95 | -13 86 |
| TN: Nashville | -101 75 | -42 95 | 28 88 |
| TN: Oak Ridge/K25 | 123 97 | 640 120 | 310 100 |
| TN: Oak Ridge/Melton | -5 79 | 70 100 | 660 120 |
| TN: Oak Ridge/Y12 E | 148 99 | -44 95 | 150 94 |
| TX: Austin | -7 88 | NS | NS |
| UT: Salt Lake City | -16 95 | 104 83 | 25 86 |
| VA: Lynchburg | -22 78 | -71 96 | -57 83 |
| WA: Olympia | -64 95 | 6 78 | 13 86 |

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.

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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. 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.

Table 9
Tritium in Drinking Water
April - June 2010

| Location | Date Collected | ³ H pCi/L ± 2 <i>u</i> |
|--------------------|----------------|--------------------------------------|
| AK: Fairbanks | 04/22/10 | 4 89 |
| AL: Dothan | 04/09/10 | -49 88 |
| AL: Montgomery | 04/07/10 | 15 87 |
| AL: Muscle Shoals | 04/01/10 | 58 88 |
| AR: Little Rock | 04/07/10 | -35 89 |
| CA: Los Angeles | 04/08/10 | -47 88 |
| CA: Richmond | 04/05/10 | -52 88 |
| CO: Denver | 04/06/10 | -6 88 |
| CT: Hartford | 04/09/10 | 310 100 |
| DE: Dover | 04/06/10 | -2 86 |
| FL: Miami | 06/29/10 | -11 90 |
| FL: Tampa | 04/20/10 | -33 87 |
| GA: Baxley | 04/06/10 | -17 89 |
| GA: Savannah | 05/26/10 | 27 79 |
| HI: Honolulu | 06/22/10 | -54 87 |
| IA: Cedar Rapids | 04/26/10 | 53 80 |
| ID: Boise | 05/10/10 | -20 77 |
| ID: Idaho Falls | 04/23/10 | -78 85 |
| IL: Morris | 06/24/10 | 24 91 |
| IL: W. Chicago | 04/26/10 | 30 79 |
| LA: New Orleans | 06/30/10 | 20 91 |
| MD: Baltimore | 04/06/10 | 0 86 |
| MD: Conowingo | 04/20/10 | 11 89 |
| MI: Detroit | 05/06/10 | 110 83 |
| MI: Grand Rapids | 04/30/10 | 63 81 |
| MN: St. Paul | 04/05/10 | 64 88 |
| MN: Welch | 04/06/10 | -46 89 |
| MO: Jefferson City | 04/06/10 | 15 86 |
| MS: Jackson | 04/13/10 | -30 87 |
| MS: Port Gibson | 04/13/10 | 50 91 |
| MT: Helena | 04/09/10 | -34 89 |
| NC: Raleigh | 04/28/10 | 16 79 |
| ND: Bismarck | 04/05/10 | 35 88 |
| NE: Lincoln | 04/07/10 | -2 90 |
| NJ: Trenton | 04/08/10 | -67 88 |
| NJ: Waretown | 04/13/10 | -32 87 |
| NM: Santa Fe | 06/11/10 | 46 92 |
| NV: Las Vegas | 06/21/10 | -9 90 |
| NY: Albany | 04/26/10 | 21 79 |
| NY: New York City | 04/13/10 | 24 91 |

Table 9 (continued)
Tritium in Drinking Water
April - June 2010

| Location | Date Collected | ³ H pCi/L ± 2 <i>u</i> |
|--------------------------|----------------|--------------------------------------|
| NY: Niagara Falls | 04/06/10 | 44 94 |
| NY: Syracuse | 04/12/10 | 6 91 |
| OH: Cincinnati | 05/06/10 | 98 82 |
| OH: Columbus | 04/06/10 | -87 87 |
| OH: E. Liverpool | 05/14/10 | 5 78 |
| OH: Painesville | 05/12/10 | 64 80 |
| OH: Toledo | 04/05/10 | 45 88 |
| OK: Oklahoma City | 04/06/10 | -54 88 |
| OR: Portland | 06/30/10 | -22 89 |
| PA: Columbia | 04/21/10 | 39 90 |
| PA: Harrisburg | 04/22/10 | 82 92 |
| PA: Philadelphia/Baxter | 05/18/10 | 25 79 |
| PA: Philadelphia/Belmont | 05/18/10 | -14 77 |
| PA: Philadelphia/Queen | 05/18/10 | 16 78 |
| PA: Pittsburgh | 05/13/10 | -7 77 |
| RI: Providence | 04/08/10 | 28 92 |
| SC: Barnwell | 04/06/10 | 0 89 |
| SC: Columbia | 04/16/10 | 82 92 |
| SC: Jenkinsville | 04/14/10 | -39 87 |
| SC: Seneca | 04/12/10 | 9 89 |
| TN: Chattanooga | 04/13/10 | 71 95 |
| TN: Knoxville | 04/05/10 | -13 89 |
| TN: Oak Ridge/#360 | 04/13/10 | 58 91 |
| TN: Oak Ridge/#371 | 04/13/10 | -4 88 |
| TN: Oak Ridge/#4442 | 04/13/10 | 13 89 |
| TN: Oak Ridge/#768 | 04/13/10 | -28 87 |
| TN: Oak Ridge/#772 | 04/13/10 | -28 87 |
| TX: Austin | 04/05/10 | 2 86 |
| VA: Ashland | 04/28/10 | 2580 190 |
| VA: Lynchburg | 04/08/10 | -32 89 |
| WA: Richland | 04/19/10 | -9 89 |
| WA: Seattle | 05/12/10 | 14 78 |

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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 2010

| Location | Date Collected | K g/L ± 2u | ¹³⁷ Cs pCi/L ± 2u | ¹⁴⁰ Ba pCi/L ± 2u | ¹³¹ I pCi/L ± 2u |
|--------------------|----------------|---------------|---------------------------------|---------------------------------|--------------------------------|
| AR: Fort Smith | 04/05/10 | 1.50 0.19 | ND | ND | ND |
| AZ: Phoenix | 06/02/10 | 1.58 0.20 | ND | ND | ND |
| CA: Los Angeles | 05/17/10 | 1.64 0.21 | ND | ND | ND |
| CA: San Francisco | 04/06/10 | 1.74 0.22 | ND | ND | ND |
| CT: Hartford | 04/19/10 | 1.72 0.21 | ND | ND | ND |
| DE: Wilmington | 05/26/10 | 1.51 0.19 | ND | ND | ND |
| FL: Plant City | 05/25/10 | 1.56 0.20 | ND | ND | ND |
| HI: Hilo | 04/19/10 | 1.75 0.21 | ND | ND | ND |
| IA: Des Moines | 06/22/10 | 1.62 0.21 | ND | ND | ND |
| KS: Wichita | 04/26/10 | 1.51 0.19 | ND | ND | ND |
| KY: Louisville | 04/05/10 | 1.56 0.20 | ND | ND | ND |
| MD: Baltimore | 04/12/10 | 1.55 0.19 | ND | ND | ND |
| MI: Detroit | 04/27/10 | 1.64 0.20 | ND | ND | ND |
| MO: Jefferson City | 05/20/10 | 1.57 0.20 | ND | ND | ND |
| NJ: Trenton | 04/16/10 | 1.55 0.19 | ND | ND | ND |
| NV: Reno | 04/13/10 | 1.62 0.21 | ND | ND | ND |
| NY: Buffalo | 05/05/10 | 1.67 0.20 | ND | ND | ND |
| NY: Syracuse | 04/28/10 | 1.54 0.20 | ND | ND | ND |
| OH: Cincinnati | 05/10/10 | 1.66 0.20 | ND | ND | ND |
| OH: Cleveland | 06/17/10 | 1.61 0.20 | ND | ND | ND |
| OR: Portland | 04/05/10 | 1.56 0.20 | ND | ND | ND |
| PA: Pittsburgh | 04/19/10 | 1.47 0.18 | ND | ND | ND |
| TN: Chattanooga | 04/22/10 | 1.56 0.19 | ND | ND | ND |
| TN: Knoxville | 04/05/10 | 1.54 0.20 | ND | ND | ND |
| TN: Memphis | 04/19/10 | 1.56 0.19 | ND | ND | ND |
| TX: San Antonio | 04/26/10 | 1.41 0.18 | ND | ND | ND |
| VT: Montpelier | 06/29/10 | 1.48 0.19 | ND | ND | ND |
| WA: Seattle | 06/22/10 | 1.64 0.20 | ND | ND | ND |
| WA: Spokane | 05/25/10 | 1.54 0.19 | ND | ND | ND |
| WV: Charleston | 04/07/10 | 1.58 0.20 | ND | ND | ND |

Note: ND = Not Detected

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, the data that are generated or publication and distribution of ERD should be directed to:

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National Air and Radiation Environmental Laboratory
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Montgomery, Alabama 36115-2601
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Requests for information concerning policies of the Office of Radiation and Indoor Air should be directed to:

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