

ENVIRONMENTAL

RADIATION

DATA

REPORT 129

January - March 2007

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](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 G-M survey meter 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 beta 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.

Precipitation samples are collected at most field stations that collect air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements.

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**  
**January 2007**

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
AL: Montgomery/408	9	0.1	0.0	0.0	0.015	0.004	0.010
AR: Little Rock	4	0.0	0.0	0.0	0.017	0.012	0.014
AZ: Phoenix	5	0.8	0.3	0.5	0.022	0.015	0.018
CA: Los Angeles	8	0.5	0.1	0.2	0.016	0.007	0.013
CA: Richmond	5	0.2	0.2	0.2	0.025	0.007	0.012
CA: San Diego	5	0.1	0.0	0.0	0.009	0.006	0.007
CA: San Jose	3	0.0	0.0	0.0	0.026	0.006	0.017
CO: Denver	9	0.0	-0.0	0.0	0.009	0.003	0.006
CT: Hartford	8	0.1	0.0	0.1	0.027	0.011	0.017
DC: Washington	8	0.2	0.0	0.1	0.020	0.005	0.009
DE: Wilmington	8	0.1	0.0	0.1	0.015	0.006	0.010
FL: Jacksonville	9	0.1	0.0	0.1	0.009	0.002	0.005
FL: Miami	2	0.0	0.0	0.0	0.005	0.004	0.004
IA: Iowa City	8	0.9	0.1	0.4	0.025	0.008	0.015
ID: Idaho Falls	9				0.033	0.004	0.017
IL: Chicago	1	0.0	0.0	0.0	0.007	0.007	0.007
IN: Indianapolis	9	0.1	0.0	0.0	0.017	0.002	0.009
KS: Kansas City	6	1.8	0.2	0.6	0.018	0.013	0.015
KS: Topeka	9	0.5	0.1	0.2	0.020	0.007	0.014
MA: Boston	8	0.0	0.0	0.0	0.007	0.003	0.005
MD: Baltimore	5	0.0	0.0	0.0	0.008	0.005	0.007
MI: Detroit	6	0.0	0.0	0.0	0.011	0.006	0.009
MI: Lansing	9	0.1	0.0	0.0	0.018	0.009	0.012
MN: St. Paul	5	0.1	0.0	0.0	0.016	0.011	0.013
MO: St. Louis	6	0.1	0.0	0.0	0.009	0.004	0.007
MS: Jackson	7	0.1	0.0	0.0	0.019	0.006	0.012
NC: Charlotte	9	0.0	0.0	0.0	0.012	0.005	0.009
NC: Wilmington	5				0.012	0.006	0.008
ND: Bismarck	4	0.5	0.1	0.2	0.020	0.006	0.014
NH: Concord	9	0.3	0.1	0.1	0.014	0.006	0.010
NJ: Trenton	8	0.3	0.1	0.1	0.011	0.005	0.007
NV: Las Vegas/913	1	0.1	0.1	0.1	0.010	0.010	0.010
NY: Albany	5	0.0	0.0	0.0	0.012	0.006	0.009
NY: New York City	8	0.0	0.0	0.0	0.024	0.010	0.017
NY: Yaphank	8	0.0	0.0	0.0	0.007	0.002	0.004
OH: Cleveland	5	0.0	0.0	0.0	0.020	0.006	0.014
OH: Painesville	9	0.1	0.0	0.1	0.013	0.007	0.010
OH: Ross	9				0.019	0.004	0.011



**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
**January 2007**

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
OR: Portland	9	0.1	0.0	0.1	0.022	0.002	0.009
PA: Harrisburg	9	0.3	0.0	0.1	0.014	0.006	0.010
PA: Pittsburgh	4	0.1	0.0	0.0	0.014	0.004	0.008
RI: Providence	9	0.1	0.0	0.0	0.007	0.003	0.005
SC: Barnwell	1	0.0	0.0	0.0	0.008	0.008	0.008
SC: Columbia	6	0.1	0.0	0.1	0.015	0.005	0.009
SD: Pierre	9	0.5	0.0	0.2	0.027	0.005	0.015
TN: Knoxville	9	0.4	0.0	0.2	0.019	0.010	0.015
TN: Memphis	8	0.0	0.0	0.0	0.012	0.004	0.008
TN: Nashville	9	0.2	0.0	0.1	0.019	0.006	0.012
TN: Oak Ridge/Bethel	7	0.3	0.1	0.2	0.012	0.006	0.010
TN: Oak Ridge/K25	7	0.3	0.1	0.2	0.014	0.006	0.010
TN: Oak Ridge/Melton	7	0.2	0.1	0.2	0.013	0.006	0.009
TN: Oak Ridge/Y12 E	7	0.2	0.0	0.1	0.013	0.006	0.011
TN: Oak Ridge/Y12 W	7	0.1	0.1	0.1	0.025	0.006	0.012
TX: Austin	7	0.1	0.0	0.1	0.016	0.008	0.011
TX: Dallas	7	0.1	0.0	0.1	0.019	0.005	0.010
TX: El Paso	8	1.5	0.2	0.7	0.024	0.010	0.017
UT: Salt Lake City	8	0.1	0.0	0.1	0.031	0.004	0.018
VA: Lynchburg	9	0.3	0.0	0.1	0.012	0.005	0.008
WA: Olympia	8	0.1	0.0	0.0	0.013	0.002	0.007
WA: Spokane	9	0.2	0.1	0.1	0.038	0.002	0.016
WI: Milwaukee	8	0.2	0.0	0.1	0.023	0.011	0.017

**Table 3**  
**Gross Beta in Airborne Particulates**  
**February 2007**

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
AL: Montgomery/408	8	0.1	0.0	0.1	0.019	0.007	0.014
AR: Little Rock	6	0.1	0.0	0.0	0.021	0.008	0.014
AZ: Phoenix	4	0.5	0.1	0.3	0.015	0.006	0.010
CA: Los Angeles	7	0.5	0.1	0.3	0.036	0.006	0.015
CA: Richmond	4	0.2	0.0	0.1	0.031	0.002	0.010
CA: San Diego	4	0.1	0.0	0.0	0.013	0.003	0.008
CA: San Francisco	1	0.0	0.0	0.0	0.003	0.003	0.003
CA: San Jose	8	0.0	-0.0	0.0	0.034	0.002	0.012
CO: Denver	8	0.2	0.0	0.1	0.018	0.004	0.007
CT: Hartford	8	0.1	0.0	0.0	0.020	0.010	0.015
DC: Washington	8	0.1	0.0	0.0	0.011	0.004	0.008
DE: Wilmington	8	0.2	0.0	0.1	0.018	0.007	0.012
FL: Jacksonville	8	0.1	0.0	0.1	0.011	0.006	0.008
FL: Miami	5	0.0	0.0	0.0	0.011	0.006	0.008
IA: Iowa City	8	0.3	0.0	0.2	0.022	0.009	0.015
ID: Idaho Falls	8				0.018	0.004	0.009
IL: Chicago	5	0.1	0.0	0.0	0.013	0.007	0.010
IN: Indianapolis	8	0.0	0.0	0.0	0.010	0.006	0.008
KS: Kansas City	8	0.5	0.2	0.3	0.020	0.007	0.014
KS: Topeka	5	0.2	0.1	0.2	0.016	0.007	0.012
MA: Boston	8	0.0	0.0	0.0	0.010	0.005	0.008
MD: Baltimore	4	0.0	0.0	0.0	0.009	0.005	0.007
MI: Detroit	7	0.0	0.0	0.0	0.011	0.006	0.009
MI: Lansing	8	0.1	0.0	0.0	0.019	0.009	0.013
MN: St. Paul	4	0.1	0.0	0.0	0.020	0.008	0.015
MO: St. Louis	4	0.1	0.0	0.0	0.010	0.007	0.009
MS: Jackson	7	0.1	0.0	0.1	0.016	0.007	0.011
NC: Charlotte	8	0.0	0.0	0.0	0.014	0.007	0.010
NC: Wilmington	2				0.015	0.013	0.014
ND: Bismarck	2	0.3	0.0	0.2	0.019	0.015	0.017
NH: Concord	8	1.0	0.0	0.2	0.013	0.007	0.010
NJ: Trenton	7	0.4	0.1	0.2	0.013	0.006	0.010
NV: Las Vegas/913	3				0.020	0.004	0.012
NY: Albany	4	0.0	0.0	0.0	0.011	0.009	0.010
NY: New York City	7	0.0	0.0	0.0	0.034	0.012	0.024
NY: Yaphank	8	0.0	0.0	0.0	0.008	0.003	0.005
OH: Painesville	6	0.0	0.0	0.0	0.017	0.008	0.011
OH: Ross	8				0.018	0.007	0.012

**Table 3 (continued)**  
**Gross Beta in Airborne Particulates**  
**February 2007**

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
OR: Portland	8	0.1	0.0	0.0	0.021	0.002	0.008
PA: Harrisburg	8	0.2	0.0	0.1	0.017	0.006	0.013
PA: Pittsburgh	5	0.0	0.0	0.0	0.014	0.005	0.008
RI: Providence	8	0.1	0.0	0.1	0.009	0.004	0.006
SC: Barnwell	1	0.0	0.0	0.0	0.016	0.016	0.016
SC: Columbia	1	0.0	0.0	0.0	0.016	0.016	0.016
SD: Pierre	7	0.3	0.1	0.2	0.019	0.008	0.012
TN: Knoxville	7	0.6	0.0	0.2	0.021	0.010	0.016
TN: Memphis	6	0.1	0.0	0.1	0.012	0.006	0.009
TN: Nashville	8	0.2	0.0	0.1	0.019	0.007	0.014
TN: Oak Ridge/Bethel	7	0.3	0.1	0.2	0.017	0.008	0.013
TN: Oak Ridge/K25	7	0.4	0.1	0.2	0.016	0.008	0.012
TN: Oak Ridge/Melton	7	0.2	0.1	0.2	0.015	0.007	0.012
TN: Oak Ridge/Y12 E	7	0.3	0.1	0.2	0.020	0.008	0.014
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.016	0.007	0.012
TX: Austin	7	0.2	0.1	0.2	0.015	0.008	0.012
TX: Dallas	7	0.3	0.0	0.1	0.015	0.006	0.011
TX: El Paso	8	1.3	0.0	0.7	0.023	0.008	0.014
UT: Salt Lake City	8	0.1	0.0	0.1	0.028	0.005	0.011
VA: Lynchburg	8	0.3	0.1	0.2	0.013	0.007	0.010
WA: Olympia	8	0.1	0.0	0.0	0.011	0.001	0.005
WA: Spokane	7	0.1	0.1	0.1	0.038	0.003	0.014
WI: Milwaukee	8	0.1	0.0	0.0	0.030	0.016	0.019

**Table 4**  
**Gross Beta in Airborne Particulates**  
**March 2007**

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
AL: Montgomery/408	9	0.3	0.0	0.1	0.019	0.009	0.013
AR: Little Rock	5	0.0	0.0	0.0	0.027	0.010	0.015
AZ: Phoenix	4	0.7	0.3	0.5	0.016	0.007	0.012
AZ: Phoenix/956	2	0.6	0.0	0.3	0.008	0.005	0.006
CA: Anaheim	1	0.1	0.1	0.1	0.008	0.008	0.008
CA: Los Angeles	10	0.4	0.0	0.2	0.019	0.003	0.010
CA: Richmond	3	0.1	0.0	0.0	0.006	0.002	0.004
CA: Riverside	7	0.2	0.0	0.1	0.016	0.005	0.010
CA: San Bernardino Cty.	8	0.0	0.0	0.0	0.020	0.006	0.012
CA: San Diego	4	0.1	0.0	0.1	0.011	0.005	0.008
CA: San Francisco	3	0.0	0.0	0.0	0.005	0.003	0.004
CA: San Jose	7	0.0	-0.0	0.0	0.010	0.004	0.006
CO: Denver	9	0.6	0.1	0.3	0.010	0.004	0.007
CT: Hartford	9	0.1	0.0	0.0	0.029	0.007	0.014
DC: Washington	9	0.1	0.0	0.0	0.011	0.004	0.008
DE: Wilmington	8	0.3	0.0	0.1	0.015	0.006	0.010
FL: Jacksonville	9	0.1	0.1	0.1	0.010	0.007	0.008
FL: Miami	2	0.0	0.0	0.0	0.007	0.005	0.006
GA: Atlanta	1	0.1	0.1	0.1	0.014	0.014	0.014
IA: Iowa City	9	0.8	0.1	0.3	0.019	0.007	0.012
ID: Idaho Falls	9				0.010	0.003	0.008
IL: Chicago	9	0.2	0.0	0.0	0.011	0.006	0.008
IN: Indianapolis	9	0.1	0.0	0.1	0.009	0.007	0.008
KS: Kansas City	7	2.4	0.3	1.3	0.024	0.003	0.016
KS: Topeka	8	1.0	0.2	0.5	0.020	0.008	0.012
MA: Boston	4	0.0	0.0	0.0	0.006	0.004	0.005
MD: Baltimore	4	0.0	0.0	0.0	0.010	0.006	0.007
MI: Detroit	9	0.1	0.0	0.0	0.041	0.006	0.014
MI: Lansing	9	0.1	0.0	0.0	0.014	0.007	0.010
MN: St. Paul	4	0.1	0.0	0.1	0.015	0.009	0.012
MO: St. Louis	7	0.0	0.0	0.0	0.014	0.006	0.009
MS: Jackson	8	0.1	0.0	0.0	0.013	0.007	0.010
NC: Charlotte	9	0.1	0.0	0.0	0.015	0.007	0.010
NC: Wilmington	3				0.012	0.009	0.011
ND: Bismarck	3	0.8	0.0	0.3	0.017	0.013	0.015
NH: Concord	9	0.0	0.0	0.0	0.014	0.004	0.009
NJ: Trenton	8	0.3	0.1	0.1	0.014	0.006	0.009
NV: Las Vegas/913	8				0.025	0.004	0.010

**Table 4 (continued)**  
**Gross Beta in Airborne Particulates**  
**March 2007**

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
NY: Albany	4	0.0	0.0	0.0	0.014	0.007	0.010
NY: New York City	8	0.0	0.0	0.0	0.022	0.011	0.017
NY: Yaphank	7	0.0	0.0	0.0	0.007	0.003	0.006
OH: Painesville	7	0.1	0.0	0.0	0.012	0.007	0.010
OH: Ross	9				0.036	0.006	0.016
OR: Portland	9	0.1	0.0	0.0	0.007	0.003	0.004
PA: Harrisburg	9	0.3	0.0	0.1	0.015	0.006	0.011
PA: Pittsburgh	9	0.1	0.0	0.0	0.009	0.005	0.007
RI: Providence	9	0.1	0.0	0.0	0.008	0.003	0.006
SC: Barnwell	3	0.1	0.0	0.0	0.013	0.008	0.011
SC: Columbia	3	0.1	0.0	0.0	0.014	0.012	0.013
SD: Pierre	9	1.2	0.1	0.3	0.017	0.006	0.012
TN: Knoxville	9	0.8	0.0	0.3	0.022	0.010	0.015
TN: Memphis	7	0.2	0.1	0.1	0.018	0.007	0.010
TN: Nashville	9	0.2	0.0	0.1	0.017	0.009	0.013
TN: Oak Ridge/Bethel	9	0.7	0.1	0.4	0.015	0.008	0.011
TN: Oak Ridge/K25	9	0.8	0.1	0.4	0.015	0.005	0.011
TN: Oak Ridge/Melton	9	0.4	0.1	0.2	0.015	0.007	0.011
TN: Oak Ridge/Y12 E	9	0.6	0.1	0.3	0.014	0.009	0.011
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.2	0.014	0.008	0.011
TX: Austin	8	0.3	0.0	0.1	0.014	0.005	0.009
TX: Dallas	7	0.3	0.0	0.1	0.015	0.005	0.008
TX: El Paso	9	1.0	0.4	0.7	0.018	0.009	0.013
TX: Ft. Worth	5	0.2	0.0	0.1	0.009	0.006	0.007
TX: Houston	2	0.0	0.0	0.0	0.005	0.004	0.005
UT: Salt Lake City	6	0.4	0.0	0.2	0.014	0.005	0.011
VA: Lynchburg	9	0.6	0.0	0.3	0.014	0.004	0.009
WA: Olympia	9	0.1	0.0	0.0	0.005	0.002	0.004
WA: Spokane	7	0.2	0.1	0.2	0.008	0.004	0.006
WI: Milwaukee	8	0.2	0.0	0.1	0.018	0.009	0.014

**Table 5**  
**Gross Beta and Specific Gamma in Precipitation**  
**January 2007**

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$	
AL: Montgomery/408	0.90	0.35	Be7	28	14
AR: Little Rock	0.42	0.31	K40	19	35
CA: Richmond	1.67	0.44		ND	
CO: Denver	1.75	0.44	Be7	35	25
CT: Hartford	1.57	0.42	Be7	39	15
DE: Wilmington	0.62	0.33	Be7	47	27
FL: Jacksonville	1.16	0.38	Be7	42	12
GA: Atlanta	0.67	0.33	Be7	39.1	9.4
IA: Iowa City	1.57	0.42	Be7	25	16
ID: Idaho Falls	0.68	0.33		ND	
KS: Kansas City	0.51	0.32	Be7	30	29
			Pb212	4.9	5.1
MA: Boston	1.29	0.38	Be7	51	17
MN: St. Paul	1.58	0.42		ND	
NC: Charlotte	1.53	0.42	Be7	42	18
NC: Wilmington	0.48	0.31	Be7	32	15
ND: Bismarck	4.31	0.73	Pb212	2.8	5.4
			Tl208	2.8	3.5
			Be7	34	28
NY: Albany	1.71	0.43	Tl208	4.1	5.0
NY: Yaphank	1.17	0.38		ND	
OH: Painesville	1.66	0.43	Be7	27	15
OR: Portland	0.61	0.33	Be7	23	25
PA: Harrisburg	0.90	0.35	Be7	38	38
TN: Knoxville	2.14	0.47	K40	11	12
TN: Nashville	0.71	0.33	Be7	32	15
TN: Oak Ridge/Melton	1.07	0.36	Be7	38	16
			K40	9	12
TX: Austin	1.29	0.40		ND	
TX: El Paso	2.81	0.56	Be7	30	18
UT: Salt Lake City	0.92	0.37		ND	
VA: Lynchburg	1.54	0.41		ND	
WA: Olympia	1.37	0.41	Be7	36	15

Note: ND = Not Detected

**Table 6**  
**Gross Beta and Specific Gamma in Precipitation**  
**February 2007**

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$	
AL: Montgomery/408	0.88	0.35	Be7	60	28
AR: Little Rock	0.57	0.33		ND	
AZ: Phoenix	4.60	0.75		ND	
CA: Richmond	0.22	0.31	Pb212	3.2	5.5
CT: Hartford	4.65	0.74	Be7	51	29
			Bi212	36	37
			K40	36	46
DE: Wilmington	1.85	0.48	Be7	80	28
			K40	27	36
FL: Jacksonville	-0.07	0.27		ND	
IA: Iowa City	3.90	0.68		ND	
ID: Idaho Falls	2.37	0.52		ND	
KS: Kansas City	0.94	0.38		ND	
MA: Boston	6.17	0.88	Be7	53	34
			K40	19	46
			Pb212	3.8	8.1
MN: St. Paul	2.08	0.50	Be7	48	36
			Pb212	4.5	6.8
NC: Charlotte	0.54	0.34	K40	19	33
NC: Wilmington	0.80	0.36	K40	23	38
ND: Bismarck	1.53	0.46	K40	22	35
NY: Albany	3.84	0.68	Be7	27	28
			Tl208	2.5	3.2
OR: Portland	1.38	0.40		ND	
PA: Harrisburg	4.21	0.69		ND	
TN: Knoxville	4.05	0.70		ND	
TN: Nashville	1.53	0.44	Be7	58	30
TN: Oak Ridge/Melton	2.61	0.54	Be7	81	43
UT: Salt Lake City	1.79	0.47		ND	
VA: Lynchburg	2.02	0.46		ND	
WA: Olympia	0.48	0.33	Be7	23	18

Note: ND = Not Detected

**Table 7**  
**Gross Beta and Specific Gamma in Precipitation**  
**March 2007**

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$	
AL: Montgomery/408	0.32	0.31	Tl208	3.6	3.9
AR: Little Rock	1.54	0.44		ND	
AZ: Phoenix	2.25	0.51		ND	
CA: Richmond	0.57	0.33		ND	
CO: Denver	3.05	0.58		ND	
CT: Hartford	3.22	0.59	Be7	47	15
DE: Wilmington	1.03	0.37	Be7	51	15
FL: Jacksonville	1.40	0.41	Be7	38	27
IA: Iowa City	2.10	0.48	Pb212	3.6	7.8
ID: Idaho Falls	2.40	0.52		ND	
KS: Kansas City	1.12	0.37		ND	
MA: Boston	1.99	0.45	Be7	49	15
MN: St. Paul	3.92	0.70	Be7	34	26
NC: Charlotte	1.50	0.41	Be7	37	10
NC: Wilmington	1.38	0.42		ND	
ND: Bismarck	11.0	1.4		ND	
NY: Albany	1.68	0.44	Be7	41	16
NY: Yaphank	0.90	0.37	Be7	27	12
			Pb212	1.5	2.3
OH: Painesville	1.68	0.45	Be7	38	34
PA: Harrisburg	0.67	0.33		ND	
TN: Knoxville	9.3	1.2	K40	21	48
TN: Nashville	1.95	0.46	Be7	31	24
			Bi212	40	30
TN: Oak Ridge/Melton	3.47	0.62	Be7	65	29
			Bi212	30	41
TX: Austin	0.58	0.33		ND	
UT: Salt Lake City	1.34	0.41	Bi212	45	27
VA: Lynchburg	1.23	0.41		ND	
WA: Olympia	0.46	0.31		ND	

Note: ND = Not Detected



**Table 8**  
**Tritium in Precipitation**  
**January - March 2007**

Location	January 2007 pCi/L $\pm 2u$	February 2007 pCi/L $\pm 2u$	March 2007 pCi/L $\pm 2u$
AL: Montgomery/408	128 82	-43 84	-23 80
AR: Little Rock	83 79	2 84	-11 83
AZ: Phoenix	NS	-47 82	0 82
CA: Richmond	117 81	-25 83	41 84
CO: Denver	37 77	NS	23 84
CT: Hartford	-71 73	13 87	-31 80
DE: Wilmington	-24 75	11 87	62 85
FL: Jacksonville	-57 74	27 87	-47 80
GA: Atlanta	-98 72	NS	NS
IA: Iowa City	120 81	6 84	-22 82
ID: Idaho Falls	55 78	-22 84	36 84
KS: Kansas City	91 80	14 85	61 86
MA: Boston	-3 76	-13 87	4 82
MN: St. Paul	109 81	-10 84	61 86
NC: Charlotte	5 76	-96 83	-35 79
NC: Wilmington	-18 76	-25 86	-62 79
ND: Bismarck	66 78	-23 83	25 84
NY: Albany	-42 74	-29 85	88 85
NY: Yaphank	-21 76	NS	-33 80
OH: Painesville	93 80	NS	63 85
OR: Portland	37 77	-16 83	NS
PA: Harrisburg	-52 74	-94 83	-56 80
TN: Knoxville	60 78	19 85	6 81
TN: Nashville	-84 75	-37 84	-6 81
TN: Oak Ridge/Melton	33 77	248 95	207 91
TX: Austin	41 77	NS	-2 84
TX: El Paso	41 77	NS	NS
UT: Salt Lake City	92 80	-54 81	2 83
VA: Lynchburg	-49 74	-42 86	-8 81
WA: Olympia	109 81	-52 81	2 83

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.

## **Beta Activity in Precipitation**

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 gross beta, tritium, and gamma-emitting radionuclides.

## **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, strontium-90, 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; (d) iodine-131 on one quarterly sample per year for each station; and (e) an annual composite for 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.

**Table 9**  
**Tritium in Drinking Water**  
**January - March 2007**

Location	Date Collected	<sup>3</sup> H pCi/L ± 2u
AK: Fairbanks	01/16/07	74 81
AL: Dothan	01/03/07	-61 79
AL: Montgomery	01/05/07	59 78
AL: Muscle Shoals	01/10/07	34 85
AL: Scottsboro	01/09/07	24 83
AR: Little Rock	01/05/07	8 76
CA: Los Angeles	01/03/07	21 77
CA: Richmond	01/03/07	-18 81
CO: Denver	01/10/07	27 83
CT: Hartford	01/05/07	-8 82
DE: Dover	01/17/07	48 79
FL: Tampa	02/06/07	-39 74
GA: Baxley	01/17/07	-14 77
GA: Savannah	03/14/07	-60 80
HI: Honolulu	02/21/07	-15 87
IA: Cedar Rapids	01/09/07	-51 79
ID: Boise	03/08/07	-55 83
ID: Idaho Falls	01/16/07	83 81
IL: Morris	03/09/07	-97 83
KS: Topeka	01/18/07	43 79
LA: New Orleans	01/30/07	550 100
MD: Baltimore	01/02/07	17 76
MD: Conowingo	03/13/07	-41 82
MI: Detroit	01/04/07	78 80
MI: Grand Rapids	01/31/07	81 81
MN: Red Wing	01/16/07	61 80
MN: St. Paul	01/31/07	57 80
MO: Jefferson City	01/02/07	57 78
MS: Jackson	01/09/07	7 78
MS: Port Gibson	01/11/07	23 79
MT: Helena	01/12/07	22 78
NC: Charlotte	02/07/07	599 98
NC: Raleigh	02/14/07	37 77
ND: Bismarck	01/03/07	11 74
NE: Lincoln	01/08/07	41 84
NH: Concord	01/05/07	62 79
NJ: Trenton	01/04/07	-37 80
NJ: Waretown	01/05/07	-95 78
NM: Santa Fe	01/05/07	10 83
NY: Albany	01/03/07	40 76

**Table 9 (continued)**  
**Tritium in Drinking Water**  
**January - March 2007**

Location	Date Collected	<sup>3</sup> H pCi/L ± 2 <i>u</i>
NY: New York City	01/23/07	60 80
NY: Syracuse	01/09/07	14 83
OH: Cincinnati	03/06/07	-23 85
OH: Columbus	03/01/07	-23 85
OH: E. Liverpool	02/27/07	-27 85
OH: Painesville	01/23/07	139 83
OH: Toledo	01/04/07	54 78
OR: Portland	03/30/07	-29 83
PA: Columbia	03/14/07	-14 83
PA: Harrisburg	03/15/07	4 84
PA: Philadelphia - Queen Lane Lab.	01/31/07	23 77
PA: Philadelphia - Belmont	01/31/07	-11 76
PA: Philadelphia - Baxter Lab.	01/31/07	-3 76
PA: Pittsburgh	02/27/07	-16 87
RI: Providence	01/16/07	20 78
SC: Barnwell	01/29/07	-66 73
SC: Columbia	01/22/07	162 85
SC: Jenkinsville	01/05/07	91 82
SC: Seneca	01/09/07	29 79
TN: Chattanooga	01/03/07	31 76
TN: Knoxville	01/04/07	29 77
TN: Oak Ridge/#360	01/09/07	-4 82
TN: Oak Ridge/#371	01/09/07	10 82
TN: Oak Ridge/#4442	01/09/07	139 88
TN: Oak Ridge/#768	01/05/07	-39 80
TN: Oak Ridge/#772	01/09/07	-65 79
TX: Austin	01/25/07	29 79
VA: Ashland	02/05/07	1440 120
WA: Richland	03/06/07	-27 85
WA: Seattle	02/05/07	-32 75

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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**  
**January - March 2007**

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
AZ: Phoenix	03/30/07	1.58 0.20	ND	ND	ND
CA: Los Angeles	01/03/07	1.49 0.19	ND	ND	ND
CA: Sacramento	03/08/07	1.39 0.22	ND	ND	ND
CA: San Francisco	01/04/07	1.54 0.20	ND	ND	ND
CT: Hartford	01/04/07	1.62 0.21	ND	ND	ND
DE: Wilmington	03/14/07	1.68 0.21	ND	ND	ND
FL: Tampa	01/11/07	1.61 0.20	2.0 1.9	ND	ND
HI: Honolulu	03/29/07	1.53 0.23	ND	ND	ND
IA: Des Moines	01/08/07	1.62 0.20	ND	ND	ND
IN: Indianapolis	02/19/07	1.57 0.21	ND	ND	ND
KS: Wichita	01/03/07	1.55 0.20	ND	ND	ND
KY: Louisville	01/08/07	1.61 0.21	ND	ND	ND
MA: Boston	03/14/07	1.60 0.20	ND	ND	ND
MD: Baltimore	01/05/07	1.58 0.21	ND	ND	ND
MO: Jefferson City	01/29/07	1.63 0.20	ND	ND	ND
NJ: Trenton	01/09/07	1.68 0.22	ND	ND	ND
NV: Las Vegas	01/16/07	1.57 0.20	ND	ND	ND
NY: Buffalo	01/05/07	1.61 0.21	ND	ND	ND
NY: Buffalo	04/06/07	1.58 0.20	ND	ND	ND
NY: Syracuse	01/05/07	1.61 0.21	ND	ND	ND
OH: Cincinnati	03/13/07	1.63 0.21	ND	ND	ND
OH: Cleveland	01/25/07	1.60 0.21	ND	ND	ND
OR: Portland	01/29/07	1.68 0.21	ND	ND	ND
PA: Pittsburgh	01/08/07	1.58 0.20	ND	ND	ND
TN: Chattanooga	03/20/07	1.66 0.20	ND	ND	ND
TN: Knoxville	01/03/07	1.61 0.20	ND	ND	ND
TN: Memphis	01/08/07	1.45 0.22	ND	ND	ND
TX: Austin	01/22/07	1.56 0.20	ND	ND	ND
TX: Ft. Worth	01/10/07	1.54 0.19	ND	ND	ND
VA: Norfolk	03/28/07	1.62 0.20	ND	ND	ND
VT: Montpelier	03/16/07	1.56 0.20	ND	ND	ND
WA: Spokane	01/29/07	1.56 0.20	ND	ND	ND
WA: Tacoma	03/15/07	1.62 0.20	ND	ND	ND
WV: Charleston	01/03/07	1.60 0.19	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.

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