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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**  
**April 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: Birmingham	3	0.1	0.1	0.1	0.017	0.006	0.011
AL: Montgomery/408	9	0.1	0.0	0.1	0.014	0.009	0.011
AR: Little Rock	5	0.1	0.0	0.0	0.020	0.006	0.013
AZ: Phoenix	4	0.6	0.2	0.4	0.012	0.009	0.010
AZ: Phoenix/956	8	14.6	0.8	4.9	0.013	0.004	0.009
CA: Anaheim	8	0.1	-0.0	0.0	0.015	0.004	0.008
CA: Los Angeles	7	0.1	0.0	0.1	0.014	0.003	0.008
CA: Richmond	4	0.1	0.0	0.0	0.006	0.002	0.004
CA: Riverside	8	0.4	0.0	0.1	0.014	0.004	0.007
CA: San Bernardino Cty.	7	0.4	-0.0	0.1	0.020	0.005	0.009
CA: San Diego	4	0.0	0.0	0.0	0.007	0.003	0.005
CA: San Francisco	5	0.0	0.0	0.0	0.005	0.002	0.003
CA: San Jose	9	0.0	-0.0	0.0	0.008	0.003	0.005
CO: Denver	8	0.9	0.3	0.5	0.014	0.004	0.008
CT: Hartford	8	0.2	0.0	0.1	0.022	0.004	0.010
DC: Washington	9	0.1	0.0	0.1	0.010	0.002	0.007
DE: Wilmington	9	0.2	0.0	0.1	0.011	0.003	0.007
FL: Jacksonville	9	0.1	0.0	0.1	0.013	0.004	0.008
FL: Miami	5	0.0	0.0	0.0	0.008	0.005	0.007
FL: Orlando	3	0.0	0.0	0.0	0.009	0.006	0.007
GA: Atlanta	6	0.1	0.0	0.0	0.011	0.007	0.009
IA: Iowa City	9	1.2	0.2	0.6	0.020	0.007	0.011
ID: Idaho Falls	9				0.011	0.005	0.007
IL: Chicago	8	0.3	0.0	0.1	0.014	0.005	0.009
IN: Indianapolis	7	0.3	0.0	0.1	0.011	0.005	0.007
KS: Kansas City	8	1.6	0.1	0.7	0.018	0.010	0.015
KS: Topeka	8	0.4	0.0	0.2	0.013	0.007	0.009
MA: Boston	9	0.0	0.0	0.0	0.007	0.001	0.004
MD: Baltimore	4	0.1	0.0	0.1	0.008	0.004	0.006
MI: Detroit	9	0.2	0.0	0.1	0.008	0.005	0.007
MI: Lansing	9	0.2	0.0	0.1	0.011	0.006	0.008
MN: St. Paul	4	0.1	0.0	0.1	0.015	0.006	0.010
MO: St. Louis	1	0.0	0.0	0.0	0.006	0.006	0.006
MS: Jackson	7	0.1	0.0	0.1	0.012	0.007	0.009
NC: Charlotte	7	0.0	0.0	0.0	0.010	0.006	0.008
NC: Wilmington	3				0.010	0.006	0.008
ND: Bismarck	3	0.5	0.1	0.4	0.012	0.008	0.010
NH: Concord	8	0.1	0.0	0.0	0.010	0.002	0.005



**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
**April 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
NJ: Trenton	8	0.2	0.0	0.1	0.008	0.001	0.005
NM: Santa Fe	2	1.4	0.0	0.7	0.014	0.003	0.008
NV: Las Vegas/913	5	0.0	0.0	0.0	0.012	0.005	0.008
NY: Albany	4	0.0	0.0	0.0	0.008	0.004	0.006
NY: New York City	6	0.1	-0.0	0.0	0.015	0.005	0.010
NY: Yaphank	9	0.0	0.0	0.0	0.004	0.000	0.003
OH: Cleveland	3	0.1	0.0	0.1	0.015	0.009	0.012
OH: Painesville	7	0.1	0.0	0.1	0.011	0.006	0.008
OH: Ross	8				0.026	0.007	0.012
OR: Portland	9	0.1	0.0	0.0	0.007	0.002	0.003
PA: Harrisburg	9	0.4	0.0	0.1	0.011	0.001	0.008
PA: Pittsburgh	8	0.3	0.0	0.1	0.007	0.004	0.006
RI: Providence	8	0.1	0.0	0.1	0.006	0.002	0.004
SC: Barnwell	2	0.0	0.0	0.0	0.009	0.006	0.007
SC: Columbia	4	0.1	0.0	0.1	0.015	0.009	0.011
SD: Pierre	9	0.7	0.1	0.3	0.013	0.007	0.011
TN: Knoxville	9	0.7	0.0	0.4	0.017	0.008	0.013
TN: Memphis	6	0.1	0.0	0.1	0.008	0.005	0.007
TN: Nashville	9	0.2	0.0	0.1	0.014	0.007	0.011
TN: Oak Ridge/Bethel	9	0.4	0.2	0.3	0.012	0.007	0.010
TN: Oak Ridge/K25	9	0.7	0.1	0.4	0.013	0.007	0.009
TN: Oak Ridge/Melton	9	0.5	0.1	0.2	0.012	0.007	0.010
TN: Oak Ridge/Y12 E	9	0.5	0.1	0.3	0.013	0.007	0.010
TN: Oak Ridge/Y12 W	9	0.2	0.1	0.1	0.013	0.007	0.010
TX: Austin	9	0.1	0.0	0.1	0.013	0.006	0.009
TX: Dallas	8	0.3	0.1	0.1	0.014	0.005	0.008
TX: El Paso	8	1.0	0.3	0.7	0.016	0.008	0.011
TX: Ft. Worth	7	0.3	0.1	0.2	0.011	0.006	0.008
TX: Houston	8	0.1	0.0	0.0	0.012	0.004	0.007
UT: Salt Lake City	7	0.3	0.1	0.2	0.012	0.007	0.010
VA: Lynchburg	9	0.4	0.1	0.2	0.011	0.006	0.008
WA: Olympia	9	0.1	0.0	0.0	0.007	0.002	0.003
WA: Spokane	9	0.4	0.1	0.3	0.009	0.004	0.007
WI: Milwaukee	9	0.3	0.0	0.1	0.022	0.010	0.015

**Table 3**  
**Gross Beta in Airborne Particulates**  
**May 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: Birmingham	9	0.3	0.0	0.2	0.023	0.009	0.014
AL: Montgomery/408	9	0.2	0.1	0.1	0.015	0.007	0.012
AR: Little Rock	5	0.0	0.0	0.0	0.021	0.010	0.015
AZ: Phoenix	5	0.3	0.0	0.2	0.015	0.009	0.012
CA: Anaheim	9	0.0	0.0	0.0	0.016	0.008	0.011
CA: Los Angeles	8	0.2	0.0	0.1	0.014	0.006	0.010
CA: Richmond	4	0.1	0.0	0.0	0.009	0.003	0.004
CA: Riverside	9	0.0	0.0	0.0	0.016	0.006	0.011
CA: San Bernardino Cty.	9	0.0	0.0	0.0	0.016	0.009	0.012
CA: San Diego	5	0.0	0.0	0.0	0.009	0.006	0.007
CA: San Francisco	4	0.0	0.0	0.0	0.007	0.003	0.004
CA: San Jose	8	0.0	0.0	0.0	0.008	0.004	0.006
CO: Denver	9	0.4	0.1	0.3	0.014	0.004	0.008
CT: Hartford	7	0.2	0.1	0.1	0.018	0.005	0.010
DC: Washington	9	0.1	0.0	0.1	0.013	0.001	0.007
DE: Wilmington	8	0.1	0.1	0.1	0.011	0.002	0.007
FL: Jacksonville	8	0.1	0.0	0.1	0.011	0.003	0.008
FL: Miami	8	0.0	0.0	0.0	0.009	0.004	0.006
FL: Orlando	8	0.1	0.0	0.0	0.016	0.004	0.009
GA: Atlanta	7	0.1	0.0	0.0	0.011	0.003	0.007
IA: Iowa City	9	2.3	0.3	0.8	0.017	0.007	0.010
ID: Idaho Falls	9				0.013	0.003	0.008
IL: Chicago	7	9.5	0.0	2.4	0.017	0.006	0.011
IN: Indianapolis	9	0.4	0.1	0.2	0.013	0.005	0.009
KS: Kansas City	10	0.6	0.0	0.3	0.017	0.011	0.015
KS: Topeka	9	0.6	0.1	0.3	0.014	0.007	0.010
MA: Boston	8	0.1	0.0	0.0	0.012	0.001	0.005
MD: Baltimore	6	0.1	0.0	0.0	0.011	0.004	0.007
MI: Detroit	7	0.4	0.0	0.1	0.014	0.006	0.009
MI: Lansing	8	0.4	0.1	0.1	0.015	0.008	0.010
MN: St. Paul	5	0.3	0.0	0.1	0.023	0.008	0.012
MS: Jackson	7	0.7	0.0	0.1	0.015	0.009	0.012
NC: Charlotte	9	0.1	0.0	0.0	0.012	0.004	0.009
NC: Wilmington	5				0.012	0.005	0.009
ND: Bismarck	3	1.3	0.2	0.7	0.010	0.008	0.009
NH: Concord	8	0.1	0.0	0.1	0.012	0.002	0.007
NJ: Edison	3	0.1	0.0	0.1	0.009	0.004	0.006
NJ: Trenton	9	0.2	0.1	0.1	0.013	0.002	0.006

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

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
NV: Las Vegas/913	6	0.0	0.0	0.0	0.010	0.004	0.007
NY: Albany	5	0.1	0.0	0.0	0.010	0.004	0.007
NY: New York City	6	0.0	0.0	0.0	0.011	0.003	0.008
NY: Yaphank	8	0.1	0.0	0.0	0.008	0.001	0.003
OH: Cleveland	8	0.4	0.0	0.1	0.023	0.010	0.015
OH: Painesville	8	0.2	0.0	0.1	0.019	0.006	0.010
OH: Ross	9				0.027	0.009	0.015
OR: Portland	8	0.2	0.0	0.1	0.013	0.003	0.006
PA: Harrisburg	7	0.4	0.1	0.2	0.016	0.005	0.009
PA: Pittsburgh	9	0.3	0.0	0.1	0.016	0.005	0.008
RI: Providence	7	0.1	0.0	0.1	0.012	0.002	0.004
SC: Barnwell	3	0.0	0.0	0.0	0.017	0.009	0.013
SC: Columbia	2	0.1	0.0	0.0	0.011	0.010	0.011
SD: Pierre	8	0.8	0.1	0.3	0.013	0.008	0.010
TN: Knoxville	7	0.6	0.0	0.2	0.027	0.010	0.015
TN: Memphis	7	0.3	0.1	0.2	0.012	0.008	0.009
TN: Nashville	8	0.4	0.0	0.2	0.018	0.004	0.013
TN: Oak Ridge/Bethel	8	0.8	0.1	0.4	0.016	0.007	0.011
TN: Oak Ridge/K25	8	1.3	0.2	0.6	0.016	0.007	0.012
TN: Oak Ridge/Melton	8	0.8	0.1	0.4	0.013	0.007	0.010
TN: Oak Ridge/Y12 E	8	1.2	0.1	0.4	0.017	0.007	0.012
TN: Oak Ridge/Y12 W	8	0.5	0.1	0.2	0.017	0.006	0.011
TX: Austin	8	0.3	0.0	0.1	0.013	0.006	0.010
TX: Dallas	6	0.2	0.0	0.1	0.012	0.008	0.009
TX: El Paso	7	1.0	0.5	0.8	0.020	0.013	0.016
TX: Houston	9	0.1	0.0	0.1	0.010	0.006	0.008
UT: Salt Lake City	6	0.4	0.1	0.2	0.022	0.006	0.013
VA: Lynchburg	7	0.7	0.0	0.3	0.014	0.005	0.009
VA: Richmond	1	0.3	0.3	0.3	0.011	0.011	0.011
WA: Olympia	8	0.1	0.0	0.0	0.011	0.002	0.004
WA: Spokane	7	0.7	0.2	0.3	0.018	0.005	0.009
WI: Milwaukee	6	0.4	0.0	0.1	0.035	0.012	0.017

**Table 4**  
**Gross Beta in Airborne Particulates**  
**June 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: Birmingham	8	0.3	0.1	0.1	0.029	0.010	0.018
AL: Montgomery/408	8	0.1	0.0	0.1	0.014	0.006	0.009
AR: Little Rock	6	0.0	0.0	0.0	0.022	0.010	0.016
AZ: Phoenix	4	0.4	0.2	0.3	0.012	0.008	0.010
CA: Anaheim	9	0.0	0.0	0.0	0.011	0.004	0.009
CA: Los Angeles	8	0.2	0.0	0.1	0.016	0.007	0.009
CA: Richmond	3	0.0	0.0	0.0	0.003	0.002	0.002
CA: Riverside	9	0.0	0.0	0.0	0.022	0.006	0.012
CA: San Bernardino Cty.	7	0.1	0.0	0.0	0.014	0.006	0.011
CA: San Diego	4	0.1	0.0	0.1	0.015	0.004	0.008
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	0.007	0.003	0.004
CO: Denver	6	0.7	0.0	0.3	0.010	0.006	0.007
CT: Hartford	7	0.3	0.0	0.1	0.027	0.007	0.015
DC: Washington	8	0.2	0.1	0.1	0.016	0.006	0.010
DE: Wilmington	9	0.2	0.1	0.1	0.012	0.006	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.018	0.005	0.008
FL: Miami	6	0.0	0.0	0.0	0.014	0.004	0.008
FL: Orlando	5	0.1	0.0	0.0	0.014	0.007	0.008
GA: Atlanta	5	0.2	0.0	0.1	0.015	0.009	0.011
IA: Iowa City	8	1.8	0.1	1.0	0.016	0.008	0.011
ID: Idaho Falls	8				0.010	0.005	0.007
IL: Chicago	8	3.5	0.0	0.6	0.016	0.006	0.010
IN: Indianapolis	9	0.4	0.1	0.2	0.016	0.006	0.009
KS: Kansas City	8	1.1	0.0	0.4	0.024	0.012	0.015
KS: Topeka	8	0.6	0.1	0.3	0.015	0.005	0.010
MA: Boston	9	0.1	0.0	0.1	0.014	0.004	0.008
MD: Baltimore	4	0.1	0.1	0.1	0.010	0.008	0.008
MI: Detroit	8	0.2	0.0	0.1	0.014	0.005	0.009
MI: Lansing	9	0.6	0.1	0.3	0.017	0.007	0.013
MN: St. Paul	4	0.2	0.0	0.1	0.015	0.009	0.011
MS: Jackson	6	0.3	0.0	0.1	0.016	0.009	0.012
NC: Charlotte	9	0.8	0.1	0.2	0.015	0.008	0.011
NC: Wilmington	3				0.008	0.008	0.008
ND: Bismarck	6	0.7	0.1	0.4	0.014	0.003	0.009
NH: Concord	9	0.1	0.0	0.1	0.013	0.005	0.008
NJ: Edison	8	0.0	0.0	0.0	0.013	0.004	0.006
NJ: Trenton	9	0.4	0.1	0.2	0.014	0.006	0.008

**Table 4 (continued)**  
**Gross Beta in Airborne Particulates**  
**June 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
NV: Las Vegas/913	5	0.0	0.0	0.0	0.010	0.007	0.008
NY: Albany	4	0.1	0.0	0.0	0.009	0.006	0.007
NY: New York City	9	0.0	0.0	0.0	0.016	0.008	0.011
NY: Yaphank	8	0.1	0.0	0.0	0.006	0.002	0.004
OH: Cleveland	9	0.4	0.0	0.1	0.025	0.008	0.016
OH: Painesville	9	0.2	0.1	0.1	0.013	0.008	0.010
OH: Ross	9				0.019	0.010	0.015
OR: Portland	7	0.2	0.0	0.1	0.016	0.001	0.005
PA: Harrisburg	9	0.5	0.1	0.3	0.018	0.006	0.011
PA: Pittsburgh	8	0.3	0.0	0.1	0.015	0.004	0.009
RI: Providence	7	0.2	0.1	0.1	0.015	0.005	0.008
SC: Barnwell	1	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	4	0.2	0.0	0.1	0.015	0.009	0.012
SD: Pierre	7	1.2	0.1	0.5	0.011	0.005	0.009
TN: Knoxville	9	0.8	0.0	0.5	0.029	0.012	0.019
TN: Memphis	6	0.6	0.1	0.3	0.015	0.010	0.012
TN: Nashville	9	0.6	0.2	0.3	0.025	0.010	0.015
TN: Oak Ridge/Bethel	8	0.8	0.3	0.6	0.018	0.009	0.013
TN: Oak Ridge/K25	8	1.4	0.4	1.0	0.019	0.011	0.013
TN: Oak Ridge/Melton	8	1.2	0.1	0.7	0.015	0.009	0.012
TN: Oak Ridge/Y12 E	8	1.3	0.5	0.8	0.021	0.010	0.015
TN: Oak Ridge/Y12 W	8	0.6	0.2	0.4	0.017	0.009	0.013
TX: Austin	8	0.1	0.0	0.1	0.016	0.007	0.012
TX: Dallas	9	0.4	-0.0	0.1	0.017	0.007	0.011
TX: El Paso	9	1.1	0.3	0.6	0.017	0.011	0.013
TX: Houston	8	0.1	0.0	0.1	0.018	0.005	0.010
UT: Salt Lake City	9	0.4	0.1	0.2	0.024	0.011	0.015
VA: Lynchburg	9	0.8	0.2	0.6	0.016	0.007	0.011
VA: Richmond	9	0.1	0.0	0.0	0.011	0.004	0.007
VA: Virginia Beach	9	0.1	0.0	0.1	0.009	0.005	0.007
WA: Olympia	9	0.1	0.0	0.0	0.004	0.001	0.002
WA: Spokane	9	0.9	0.2	0.4	0.021	0.004	0.009
WI: Milwaukee	7	0.5	0.0	0.2	0.033	0.013	0.020

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

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$	
AL: Montgomery/408	2.63	0.54		ND	
AR: Little Rock	1.10	0.37		ND	
AZ: Phoenix	8.7	1.5		ND	
CA: Richmond	0.82	0.34		ND	
CO: Denver	2.77	0.55	Pb212	4.0	4.9
CT: Hartford	1.83	0.46	Be7	55	35
			Tl208	2.5	3.7
DE: Wilmington	0.66	0.34	Be7	23	25
FL: Jacksonville	6.38	0.96	Be7	29	24
GA: Atlanta	0.95	0.38	Be7	36	23
IA: Iowa City	1.27	0.39		ND	
KS: Kansas City	1.42	0.42	Tl208	3.3	4.3
MA: Boston	1.45	0.41	Be7	74	33
MI: Lansing	1.12	0.40		ND	
MN: St. Paul	9.4	1.2		ND	
NC: Charlotte	1.08	0.38	Be7	51	24
NC: Wilmington	1.96	0.48		ND	
ND: Bismarck	1.11	0.40		ND	
NH: Concord	1.10	0.38	Be7	47	32
NM: Santa Fe	1.15	0.37		ND	
NY: Albany	2.20	0.48		ND	
NY: Yaphank	2.42	0.50	Be7	40	27
OH: Painesville	1.35	0.43	Be7	81	32
			Bi212	35	50
OR: Portland	1.08	0.37	Be7	26	28
PA: Harrisburg	0.59	0.34		ND	
TN: Knoxville	3.48	0.61		ND	
TN: Nashville	1.06	0.38	Be7	28	30
			K40	18	35
			Pb212	5.0	6.2
TN: Oak Ridge/K25	1.18	0.39	Be7	47	28
TN: Oak Ridge/Melton	3.43	0.62		ND	
TX: Austin	2.84	0.57		ND	
UT: Salt Lake City	4.08	0.69		ND	
VA: Lynchburg	1.32	0.40		ND	
WA: Olympia	1.04	0.37	Be7	45	38

Note: ND = Not Detected

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

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	$\pm 2u$	Nuclide	pCi/L $\pm 2u$
AR: Little Rock	0.89	0.37		ND
CA: Richmond	0.58	0.33		ND
CO: Denver	3.11	0.56	Be7	88 33
			Pb212	7.8 6.1
CT: Hartford	1.78	0.44	Be7	54 16
DE: Wilmington	1.96	0.47	Be7	21 10
FL: Jacksonville	2.45	0.54	Pb212	4.7 6.3
GA: Atlanta	1.79	0.44	Be7	63 33
IA: Iowa City	0.87	0.37	Be7	24 14
KS: Kansas City	1.38	0.41	Be7	29 15
MA: Boston	1.23	0.38	Be7	40 17
MI: Lansing	1.08	0.37	Be7	26 15
MN: St. Paul	3.56	0.62		ND
NC: Wilmington	1.50	0.44	K40	12 16
ND: Bismarck	1.87	0.47	Be7	12.4 7.5
NH: Concord	1.89	0.45	Be7	89 18
NY: Albany	3.05	0.58	Be7	64 17
NY: Yaphank	3.81	0.65	Be7	33.1 9.4
OR: Portland	0.94	0.36	Be7	50 26
PA: Harrisburg	8.2	1.1	Be7	121 38
TN: Knoxville	2.05	0.48	K40	56 52
TN: Nashville	1.26	0.39	Be7	36 16
TN: Oak Ridge/K25	1.32	0.40	Be7	56 17
TN: Oak Ridge/Melton	3.15	0.58		ND
TX: Austin	1.47	0.41	Be7	16 14
TX: Dallas	1.18	0.39		ND
TX: El Paso	1.14	0.38	Pb212	4.2 4.9
UT: Salt Lake City	3.39	0.62		ND
VA: Lynchburg	9.4	1.2		ND
WA: Olympia	1.01	0.37	Be7	59 35

Note: ND = Not Detected

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

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	$\pm 2u$	Nuclide	pCi/L $\pm 2u$
CO: Denver	1.01	0.36	Be7	54 32
DE: Wilmington	0.81	0.34	Be7	61 17
FL: Jacksonville	0.68	0.33	Be7	28.3 9.9
			Pb212	2.7 2.4
			Tl208	0.7 1.2
			Pb212	6.5 5.3
FL: Miami	3.31	0.61	Tl208	2.5 3.5
			Pb212	6.5 5.3
GA: Atlanta	3.75	0.63	Be7	85 14
IA: Iowa City	0.60	0.33	Pb212	5.8 6.3
KS: Kansas City	0.82	0.35	Be7	19 16
			Pb212	2.5 2.7
MA: Boston	1.59	0.42	Be7	37 15
MI: Lansing	1.63	0.43	Be7	27 14
MN: St. Paul	1.84	0.45	Be7	39 14
NC: Charlotte	2.96	0.56	Be7	78 18
ND: Bismarck	0.55	0.32	Be7	13 13
NH: Concord	3.30	0.58	Be7	74 35
NM: Santa Fe	5.83	0.86	Be7	88 26
			Pb212	4.6 4.8
NY: Albany	3.12	0.57	Be7	54 15
OH: Painesville	0.97	0.36	Be7	37 16
OR: Portland	2.34	0.50		ND
PA: Harrisburg	2.98	0.55	Be7	56 32
TN: Knoxville	3.48	0.63		ND
TN: Nashville	2.13	0.48	Be7	14 15
TN: Oak Ridge/K25	2.01	0.45	Be7	76 33
			Pb212	7.5 6.4
TN: Oak Ridge/Melton	2.85	0.55	Be7	66 17
TX: Austin	1.28	0.39	Be7	14 12
TX: Dallas	0.28	0.29		ND
TX: El Paso	1.76	0.45		ND
UT: Salt Lake City	1.40	0.42		ND
VA: Lynchburg	8.4	1.1		ND
WA: Olympia	1.53	0.43	Be7	79 19

Note: ND = Not Detected



**Table 8**  
**Tritium in Precipitation**  
**April - June 2007**

Location	April 2007 pCi/L $\pm 2u$	May 2007 pCi/L $\pm 2u$	June 2007 pCi/L $\pm 2u$
AL: Montgomery/408	70 83	NS	NS
AR: Little Rock	-11 79	23 78	NS
AZ: Phoenix	11 80	NS	NS
CA: Richmond	27 81	16 78	NS
CO: Denver	97 85	33 79	-14 82
CT: Hartford	16 83	-18 81	NS
DE: Wilmington	34 83	27 83	-10 82
FL: Jacksonville	38 81	16 82	-46 80
FL: Miami	NS	NS	17 83
GA: Atlanta	-11 79	26 80	8 82
IA: Iowa City	36 82	65 81	-50 80
KS: Kansas City	48 82	71 81	14 83
MA: Boston	-32 80	32 83	0 82
MI: Lansing	43 82	18 78	-10 85
MN: St. Paul	43 82	20 78	21 84
NC: Charlotte	34 84	NS	93 87
NC: Wilmington	27 83	9 81	NS
ND: Bismarck	57 82	76 80	23 83
NH: Concord	0 82	45 83	64 85
NM: Santa Fe	4 80	NS	8 83
NY: Albany	67 86	12 82	39 84
NY: Yaphank	29 83	-23 80	-15 81
OH: Painesville	55 82	NS	-8 82
OR: Portland	12 80	18 78	-73 79
PA: Harrisburg	-14 81	14 78	25 84
TN: Knoxville	-7 80	80 81	-8 81
TN: Nashville	0 80	-33 75	-32 83
TN: Oak Ridge/K25	101 87	261 89	-18 82
TN: Oak Ridge/Melton	75 83	87 81	43 84
TX: Austin	82 83	12 78	-80 79
TX: Dallas	NS	2 77	-33 81
TX: El Paso	NS	51 80	-64 79
UT: Salt Lake City	72 82	61 80	10 83
VA: Lynchburg	18 83	37 83	41 84
WA: Olympia	-14 80	23 77	-39 81

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**  
**April - June 2007**

Location	Date Collected	<sup>3</sup> H pCi/L ± 2u
AK: Fairbanks	04/11/07	18 79
AL: Dothan	04/11/07	21 82
AL: Montgomery	04/06/07	25 85
AL: Muscle Shoals	04/04/07	17 82
AL: Scottsboro	04/03/07	35 83
AR: Little Rock	04/13/07	23 78
CA: Los Angeles	04/03/07	34 84
CA: Richmond	04/04/07	31 82
CO: Denver	04/13/07	79 81
CT: Hartford	04/04/07	-21 80
DE: Dover	04/04/07	-34 81
FL: Tampa	04/04/07	-35 82
GA: Baxley	05/09/07	2 81
GA: Savannah	05/16/07	-21 80
HI: Honolulu	06/12/07	47 87
IA: Cedar Rapids	04/04/07	27 85
ID: Boise	05/22/07	-46 79
ID: Idaho Falls	04/16/07	21 79
IL: Morris	05/16/07	5 81
IL: W. Chicago	04/17/07	25 79
KS: Topeka	04/11/07	10 81
LA: New Orleans	06/04/07	7 81
MD: Baltimore	04/04/07	-14 83
MD: Conowingo	06/12/07	-16 80
MI: Detroit	04/02/07	50 86
MI: Grand Rapids	04/16/07	34 80
MN: Red Wing	04/11/07	-9 78
MN: St. Paul	04/25/07	-7 82
MO: Jefferson City	04/02/07	51 87
MS: Jackson	04/03/07	-23 82
MS: Port Gibson	04/03/07	-47 82
MT: Helena	04/13/07	77 82
NC: Charlotte	04/11/07	1050 120
NC: Raleigh	04/11/07	-4 78
ND: Bismarck	04/03/07	-15 83
NE: Lincoln	04/06/07	-39 82
NH: Concord	04/18/07	-30 77
NJ: Trenton	04/04/07	-2 84
NJ: Waretown	04/10/07	16 82
NM: Santa Fe	04/10/07	15 82

**Table 9 (continued)**  
**Tritium in Drinking Water**  
**April - June 2007**

Location	Date Collected	<sup>3</sup> H pCi/L ± 2 <i>u</i>
NV: Las Vegas	04/26/07	-32 81
NY: Albany	04/05/07	33 82
NY: New York City	04/06/07	16 78
NY: Syracuse	04/18/07	27 83
OH: Cincinnati	05/17/07	-18 81
OH: Columbus	04/19/07	-12 77
OH: E. Liverpool	04/25/07	-22 82
OH: Painesville	04/30/07	-16 81
OH: Toledo	04/04/07	74 87
OR: Portland	06/29/07	43 85
PA: Columbia	06/13/07	1280 130
PA: Harrisburg	06/14/07	87 85
PA: Philadelphia/Baxter	04/30/07	16 83
PA: Philadelphia/Belmont	04/30/07	-34 80
PA: Philadelphia/Queen	04/30/07	-41 80
PA: Pittsburgh	04/25/07	-28 80
RI: Providence	04/18/07	-61 67
SC: Barnwell	04/18/07	67 81
SC: Columbia	04/20/07	25 79
SC: Jenkinsville	04/06/07	-39 81
SC: Seneca	04/02/07	2 84
TN: Chattanooga	04/02/07	93 88
TN: Knoxville	04/02/07	0 83
TN: Oak Ridge/#360	04/03/07	10 85
TN: Oak Ridge/#371	04/03/07	33 85
TN: Oak Ridge/#4442	04/13/07	133 84
TN: Oak Ridge/#768	04/03/07	-8 83
TN: Oak Ridge/#772	04/13/07	106 82
TX: Austin	04/16/07	44 80
VA: Lynchburg	04/16/07	12 79
WA: Richland	04/09/07	19 82
WA: Seattle	06/06/07	4 82

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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 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
AR: Little Rock	06/25/07	1.56 0.20	ND	ND	ND
AZ: Phoenix	06/30/07	1.49 0.22	ND	ND	ND
CA: Los Angeles	04/10/07	1.58 0.20	ND	ND	ND
CA: Sacramento	05/10/07	1.87 0.23	ND	ND	ND
CA: San Francisco	04/04/07	1.76 0.21	ND	ND	ND
DE: Wilmington	04/24/07	1.69 0.21	ND	ND	ND
HI: Honolulu	06/18/07	1.45 0.19	ND	ND	ND
IA: Des Moines	06/04/07	1.50 0.19	ND	ND	ND
KS: Wichita	04/04/07	1.51 0.23	ND	ND	ND
KY: Louisville	04/09/07	1.57 0.20	ND	ND	ND
MA: Boston	06/20/07	1.54 0.23	ND	ND	ND
MD: Baltimore	04/06/07	1.54 0.20	ND	ND	ND
MI: Detroit	06/04/07	1.68 0.21	ND	ND	ND
MO: Jefferson City	05/17/07	1.62 0.20	ND	ND	ND
NJ: Trenton	05/10/07	1.62 0.21	ND	ND	ND
NM: Albuquerque	04/19/07	1.54 0.20	ND	ND	ND
NV: Las Vegas	04/02/07	1.79 0.22	ND	ND	ND
NY: Syracuse	04/10/07	1.58 0.19	ND	ND	ND
OH: Cincinnati	05/07/07	1.56 0.20	ND	ND	ND
OH: Cleveland	04/09/07	1.61 0.20	ND	ND	ND
OR: Portland	04/23/07	1.69 0.21	ND	ND	ND
PA: Pittsburgh	05/08/07	1.75 0.21	ND	ND	ND
TN: Chattanooga	06/07/07	1.58 0.20	ND	ND	ND
TN: Knoxville	05/16/07	1.56 0.23	ND	ND	ND
TN: Memphis	04/09/07	1.64 0.21	ND	ND	ND
TX: Austin	04/16/07	1.47 0.19	ND	ND	ND
TX: Ft. Worth	04/11/07	1.66 0.20	ND	ND	ND
VA: Norfolk	06/21/07	1.68 0.22	ND	ND	ND
VT: Montpelier	04/30/07	1.73 0.21	ND	ND	ND
WA: Spokane	04/04/07	1.48 0.19	ND	ND	ND
WA: Tacoma	06/29/07	1.68 0.21	ND	ND	ND
WV: Charleston	04/12/07	1.55 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.

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