

ENVIRONMENTAL

RADIATION

DATA

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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 Environmental Radiation Ambient Monitoring System (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 ERAMS in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS 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 ERAMS 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 Environmental Radiation Ambient Monitoring System (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 ERAMS. 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 blank sample.

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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 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/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.

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 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AL: Montgomery	7	0.2	0.0	0.1	0.017	0.005	0.011
AL: Montgomery/408	2	0.0	0.0	0.0	0.015	0.008	0.012
AR: Little Rock	7	0.0	0.0	0.0	0.027	0.006	0.016
AZ: Phoenix	4	0.8	0.1	0.4	0.020	0.009	0.013
CA: Los Angeles	8	0.4	0.1	0.3	0.024	0.002	0.011
CA: Richmond	3	0.1	0.0	0.1	0.019	0.002	0.009
CO: Denver	9	1.4	0.2	0.5	0.053	0.005	0.017
CT: Hartford	9	0.0	0.0	0.0	0.013	0.007	0.009
DC: Washington	9	0.0	0.0	0.0	0.014	0.003	0.008
DE: Wilmington	8	0.1	0.0	0.1	0.021	0.004	0.012
FL: Jacksonville	8	0.1	0.0	0.1	0.014	0.004	0.009
FL: Miami	5	0.1	0.0	0.0	0.014	0.004	0.009
GA: Atlanta	4	0.0	0.0	0.0	0.019	0.010	0.015
HI: Honolulu	6	0.1	0.0	0.1	0.006	0.003	0.004
IA: Iowa City	8	0.2	0.0	0.1	0.040	0.018	0.025
ID: Idaho Falls	9				0.033	0.006	0.018
IL: Chicago	3	0.0	0.0	0.0	0.020	0.015	0.017
IN: Indianapolis	8	0.1	0.0	0.0	0.020	0.004	0.010
KS: Kansas City	1	0.5	0.5	0.5	0.019	0.019	0.019
KS: Topeka	2	1.0	0.5	0.7	0.018	0.015	0.016
MA: Boston	7	0.1	0.0	0.1	0.018	0.007	0.012
ME: Augusta	2	0.0	0.0	0.0	0.010	0.010	0.010
MI: Detroit	8	0.4	0.1	0.2	0.019	0.008	0.014
MI: Lansing	9	0.1	0.0	0.0	0.023	0.012	0.015
MN: Minneapolis	5	0.1	0.1	0.1	0.029	0.016	0.024
MS: Jackson	5	0.1	0.0	0.1	0.030	0.005	0.013
NC: Charlotte	8	0.1	0.0	0.0	0.018	0.009	0.014
NC: Wilmington	4				0.015	0.008	0.011
ND: Bismarck	3	0.5	0.2	0.4	0.040	0.022	0.034
NH: Concord	9	0.1	0.0	0.1	0.017	0.007	0.011
NJ: Trenton	7	0.2	0.0	0.1	0.019	0.007	0.011
NM: Santa Fe	3	0.8	0.0	0.5	0.009	0.005	0.006
NV: Las Vegas	2	0.0	0.0	0.0	0.007	0.005	0.006
NV: Las Vegas/906	3	0.0	0.0	0.0	0.026	0.004	0.015
NV: Las Vegas/913	3	0.0	0.0	0.0	0.020	0.003	0.010
NY: Albany	4	0.0	0.0	0.0	0.013	0.011	0.012
NY: New York City	8	0.0	0.0	0.0	0.028	0.013	0.021
NY: Yaphank	9	0.1	0.0	0.0	0.017	0.007	0.011

Table 2 (continued)
Gross Beta in Airborne Particulates
January 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
OH: Painesville	8	0.1	0.0	0.1	0.013	0.009	0.012
OH: Ross	8				0.020	0.004	0.011
OR: Portland	8	0.1	0.0	0.1	0.030	0.005	0.013
PA: Harrisburg	9	0.1	0.0	0.1	0.022	0.007	0.014
PA: Philadelphia	8	0.1	0.0	0.0	0.022	0.007	0.013
PA: Pittsburgh	9	0.1	0.0	0.0	0.016	0.004	0.011
SC: Barnwell	1	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	5	0.1	0.1	0.1	0.013	0.009	0.011
SD: Pierre	9	0.5	0.1	0.2	0.040	0.014	0.024
TN: Knoxville	4	0.2	0.0	0.1	0.021	0.019	0.020
TN: Nashville	9	0.2	0.0	0.1	0.023	0.007	0.013
TN: Oak Ridge/Bethel	7	0.3	0.1	0.2	0.015	0.006	0.010
TN: Oak Ridge/K25	7	0.4	0.1	0.2	0.015	0.006	0.011
TN: Oak Ridge/Melton	7	0.2	0.1	0.1	0.015	0.005	0.011
TN: Oak Ridge/Y12 E	7	0.2	0.1	0.1	0.018	0.006	0.013
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.017	0.007	0.012
TX: Austin	8	0.2	0.0	0.1	0.021	0.006	0.014
TX: Dallas	5	0.8	0.0	0.3	0.023	0.009	0.017
TX: El Paso	8	2.1	0.6	1.1	0.038	0.010	0.018
UT: Salt Lake City	8	0.2	0.0	0.1	0.021	0.004	0.014
VA: Lynchburg	8	0.6	0.0	0.2	0.015	0.006	0.011
WA: Olympia	9	0.1	0.0	0.1	0.016	0.002	0.009
WA: Spokane	8	0.3	0.1	0.1	0.034	0.014	0.022

Table 3
Gross Beta in Airborne Particulates
February 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery/408	8	0.0	0.0	0.0	0.014	0.006	0.010
AR: Little Rock	7	0.0	0.0	0.0	0.022	0.011	0.016
AZ: Phoenix	4	0.5	0.2	0.3	0.015	0.008	0.012
CA: Los Angeles	8	0.4	0.1	0.3	0.012	0.003	0.009
CA: Richmond	4	0.1	0.0	0.0	0.013	0.003	0.008
CO: Denver	7	2.4	0.2	0.8	0.025	0.005	0.012
CT: Hartford	8	0.0	0.0	0.0	0.010	0.004	0.007
DC: Washington	9	0.1	0.0	0.0	0.012	0.006	0.009
DE: Wilmington	9	0.3	0.0	0.1	0.010	0.009	0.009
FL: Jacksonville	8	0.1	0.1	0.1	0.012	0.005	0.008
FL: Miami	5	0.0	0.0	0.0	0.010	0.005	0.008
GA: Atlanta	4	0.0	0.0	0.0	0.012	0.008	0.011
HI: Honolulu	5	0.1	0.0	0.1	0.007	0.003	0.005
IA: Iowa City	9	0.2	0.0	0.1	0.024	0.011	0.016
ID: Idaho Falls	8				0.018	0.008	0.013
IL: Chicago	8	0.2	0.0	0.1	0.019	0.010	0.013
IN: Indianapolis	8	0.1	0.0	0.1	0.012	0.007	0.010
KS: Topeka	4	0.8	0.6	0.7	0.026	0.015	0.020
ME: Augusta	3	0.1	0.1	0.1	0.016	0.010	0.013
MI: Detroit	8	0.2	0.0	0.1	0.023	0.008	0.012
MI: Lansing	8	0.1	0.0	0.0	0.018	0.009	0.012
MN: Minneapolis	4	0.1	0.0	0.1	0.022	0.012	0.017
MS: Jackson	8	0.0	0.0	0.0	0.015	0.006	0.010
NC: Charlotte	8	0.0	0.0	0.0	0.014	0.006	0.010
NC: Wilmington	4				0.011	0.007	0.009
ND: Bismarck	6	1.0	0.0	0.5	0.036	0.013	0.023
NH: Concord	8	0.1	0.0	0.1	0.010	0.007	0.009
NJ: Trenton	8	0.1	0.1	0.1	0.011	0.006	0.009
NM: Santa Fe	2	1.2	0.1	0.6	0.012	0.006	0.009
NV: Las Vegas/906	4	0.1	0.0	0.0	0.018	0.005	0.010
NV: Las Vegas/913	4	0.1	-0.0	0.0	0.018	0.004	0.008
NY: Albany	4	0.0	0.0	0.0	0.014	0.007	0.009
NY: New York City	9	0.0	0.0	0.0	0.024	0.014	0.018
NY: Yaphank	6	0.2	0.0	0.1	0.012	0.005	0.008
OH: Painesville	7	0.1	0.0	0.1	0.015	0.006	0.010
OH: Ross	8				0.017	0.007	0.012
OR: Portland	8	0.2	0.0	0.1	0.015	0.003	0.008
PA: Harrisburg	8	0.1	0.0	0.1	0.016	0.010	0.012

Table 3 (continued)
Gross Beta in Airborne Particulates
February 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
PA: Philadelphia	8	0.1	0.0	0.0	0.015	0.009	0.012
PA: Pittsburgh	7	0.1	0.0	0.0	0.016	0.007	0.011
SC: Columbia	2	0.1	0.0	0.1	0.009	0.008	0.009
SD: Pierre	4	0.3	0.1	0.2	0.019	0.012	0.015
TN: Knoxville	4	0.0	0.0	0.0	0.017	0.010	0.013
TN: Nashville	8	0.2	0.0	0.1	0.019	0.009	0.014
TN: Oak Ridge/Bethel	7	0.3	0.1	0.2	0.015	0.008	0.012
TN: Oak Ridge/K25	7	0.4	0.1	0.3	0.016	0.010	0.012
TN: Oak Ridge/Melton	7	0.3	0.1	0.2	0.017	0.008	0.012
TN: Oak Ridge/Y12 E	7	0.3	0.1	0.2	0.018	0.009	0.013
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.018	0.009	0.013
TX: Austin	7	0.1	0.0	0.0	0.014	0.008	0.012
TX: Dallas	8	0.2	0.1	0.1	0.018	0.009	0.014
TX: El Paso	8	1.4	0.3	0.7	0.017	0.007	0.013
UT: Salt Lake City	8	0.4	0.0	0.2	0.018	0.006	0.013
VA: Lynchburg	8	0.3	0.1	0.2	0.012	0.008	0.010
WA: Olympia	7	0.2	0.0	0.1	0.014	0.001	0.007
WA: Spokane	8	1.0	0.2	0.4	0.036	0.008	0.019

Table 4
Gross Beta in Airborne Particulates
March 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AL: Montgomery/408	9	0.2	0.0	0.0	0.014	0.004	0.008
AR: Little Rock	8	0.1	0.0	0.0	0.011	0.008	0.009
AZ: Phoenix	5	0.5	0.1	0.3	0.019	0.006	0.010
CA: Los Angeles	9	0.3	0.1	0.2	0.016	0.006	0.010
CA: Richmond	5	0.1	0.0	0.0	0.011	0.004	0.006
CO: Denver	10	1.5	0.2	0.6	0.013	0.004	0.009
CT: Hartford	8	0.1	0.0	0.0	0.009	0.005	0.007
DC: Washington	9	0.0	0.0	0.0	0.011	0.003	0.007
DE: Wilmington	5	0.2	0.0	0.1	0.011	0.006	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.012	0.004	0.007
FL: Miami	4	0.0	0.0	0.0	0.011	0.006	0.008
GA: Atlanta	1	0.0	0.0	0.0	0.011	0.011	0.011
HI: Honolulu	6	0.1	0.0	0.0	0.010	0.003	0.005
IA: Iowa City	8	0.5	0.1	0.3	0.015	0.007	0.010
ID: Idaho Falls	8				0.019	0.004	0.009
IL: Chicago	9	0.2	0.0	0.1	0.013	0.009	0.011
IN: Indianapolis	8	0.6	0.1	0.2	0.013	0.007	0.009
KS: Topeka	9	2.1	0.6	1.1	0.018	0.010	0.013
ME: Augusta	3	0.1	0.1	0.1	0.009	0.006	0.008
MI: Detroit	9	0.8	0.0	0.3	0.012	0.006	0.010
MI: Lansing	9	0.2	0.0	0.1	0.014	0.006	0.011
MN: Minneapolis	4	0.2	0.1	0.1	0.014	0.010	0.012
MS: Jackson	8	0.1	0.0	0.0	0.014	0.006	0.009
NC: Charlotte	9	0.1	0.0	0.0	0.017	0.005	0.010
NC: Wilmington	4				0.011	0.005	0.008
ND: Bismarck	7	0.5	0.0	0.3	0.027	0.013	0.017
NH: Concord	3	0.1	0.0	0.1	0.010	0.008	0.009
NJ: Trenton	9	0.2	0.1	0.1	0.010	0.003	0.007
NV: Las Vegas/906	2	0.0	0.0	0.0	0.008	0.008	0.008
NV: Las Vegas/913	3	0.0	0.0	0.0	0.009	0.007	0.008
NY: Albany	5	0.0	0.0	0.0	0.008	0.007	0.008
NY: New York City	8	0.0	0.0	0.0	0.020	0.010	0.016
NY: Yaphank	4	0.0	0.0	0.0	0.008	0.003	0.005
OH: Painesville	9	0.1	0.1	0.1	0.011	0.007	0.009
OH: Ross	9				0.021	0.007	0.013
OR: Portland	9	0.1	0.0	0.1	0.018	0.002	0.006
PA: Harrisburg	9	0.2	0.0	0.1	0.013	0.004	0.010
PA: Philadelphia	6	0.1	0.0	0.0	0.013	0.007	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
March 2005

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
PA: Pittsburgh	9	0.2	0.0	0.1	0.012	0.005	0.009
SC: Columbia	3	0.1	0.0	0.0	0.014	0.007	0.011
SD: Pierre	7	0.4	0.1	0.2	0.013	0.009	0.011
TN: Knoxville	5	0.1	0.0	0.0	0.016	0.008	0.012
TN: Nashville	8	0.2	0.0	0.1	0.017	0.009	0.012
TN: Oak Ridge/Bethel	9	0.3	0.0	0.2	0.012	0.006	0.009
TN: Oak Ridge/K25	9	0.5	0.1	0.3	0.014	0.006	0.010
TN: Oak Ridge/Melton	9	0.3	0.1	0.2	0.013	0.007	0.009
TN: Oak Ridge/Y12 E	9	0.4	0.1	0.2	0.015	0.007	0.010
TN: Oak Ridge/Y12 W	9	0.2	0.1	0.1	0.014	0.007	0.010
TX: Austin	9	0.1	0.0	0.0	0.013	0.006	0.009
TX: Dallas	7	0.3	0.0	0.2	0.015	0.008	0.010
TX: El Paso	8	1.4	0.5	0.7	0.017	0.008	0.011
UT: Salt Lake City	7	0.4	0.0	0.2	0.019	0.006	0.011
VA: Lynchburg	9	0.3	0.1	0.1	0.012	0.004	0.007
WA: Olympia	6	0.2	0.0	0.1	0.006	0.003	0.004
WA: Spokane	8	1.2	0.1	0.4	0.014	0.004	0.008

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery/408	0.24	0.27		ND
AR: Little Rock	0.90	0.32	Be7	48 19
AZ: Phoenix	0.48	0.30		ND
CA: Richmond	0.53	0.30		ND
CO: Denver	6.09	0.59	Be7	48 31
			Ra224	27 24
CT: Hartford	1.44	0.35	Be7	25.7 9.2
FL: Jacksonville	0.40	0.31		ND
GA: Atlanta	0.78	0.31		ND
HI: Honolulu	0.47	0.28	K40	9 13
IA: Iowa City	0.27	0.28		ND
KS: Kansas City	0.25	0.28		ND
MA: Boston	3.34	0.46	Be7	41 12
MN: Minneapolis	3.88	0.51	Be7	79 38
NC: Charlotte	0.21	0.26		ND
NC: Wilmington	1.13	0.35	Be7	59 25
NM: Santa Fe	1.75	0.38		ND
NV: Las Vegas/906	1.15	0.34	Pb212	4.2 6.6
NY: Albany	1.37	0.37	Be7	30 18
			K40	15 13
NY: Yaphank	0.97	0.33	Be7	16 17
OH: Painesville	1.61	0.37	Be7	32 24
OR: Portland	0.97	0.32		ND
PA: Harrisburg	2.45	0.41	Be7	28 23
TN: Knoxville	6.92	0.62		ND
TN: Nashville	0.99	0.34		ND
TN: Oak Ridge/Melton	1.63	0.37	Be7	40 44
TX: Austin	0.63	0.29		ND
TX: Dallas	0.29	0.30		ND
TX: El Paso	0.75	0.33		ND
UT: Salt Lake City	0.74	0.31		ND
VA: Lynchburg	1.11	0.35		ND
WA: Olympia	0.60	0.30	Be7	20 16

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery/408	1.09	0.33	Be7	46 23
AR: Little Rock	1.38	0.34	Be7	86 42
			K40	104 43
AZ: Phoenix	0.79	0.31	K40	32 36
CA: Richmond	0.49	0.28	K40	21 11
			Tl208	1.0 1.3
CO: Denver	19.1	1.1		ND
CT: Hartford	1.63	0.38	Be7	61 36
			Pb212	4.7 5.5
			Tl208	4.2 3.5
FL: Jacksonville	1.34	0.37	Be7	60 27
GA: Atlanta	1.00	0.32	Be7	65 27
HI: Honolulu	1.24	0.35		ND
IA: Iowa City	0.99	0.34		ND
ID: Idaho Falls	0.98	0.33	Tl208	3.1 3.7
KS: Kansas City	0.26	0.27	Pb212	6.7 7.7
			Tl208	2.4 4.0
MA: Boston	1.58	0.36	K40	74 45
MN: Minneapolis	1.74	0.40		ND
NC: Charlotte	1.43	0.35	Be7	66 34
			K40	130 30
			Pb212	8.0 5.9
			Ra228	16.5 7.8
NM: Santa Fe	3.33	0.46	Be7	67 27
NV: Las Vegas/906	0.61	0.30	Tl208	2.4 3.6
NY: Albany	1.92	0.38	Pb212	9.5 5.7
			Tl208	1.9 3.5
NY: Yaphank	0.98	0.32	K40	74 48
OH: Painesville	1.55	0.36	Be7	50 29
OR: Portland	1.17	0.34	Be7	88 31
PA: Harrisburg	1.36	0.36	Be7	51 15
TN: Knoxville	1.54	0.37		ND
TN: Nashville	0.38	0.28	Be7	56 18
TN: Oak Ridge/Melton	1.66	0.36		ND
TX: Dallas	0.59	0.30	Be7	23 15
TX: El Paso	0.59	0.30		ND
UT: Salt Lake City	1.43	0.37		ND

Note: ND = Not Detected

Table 6 (continued)
Gross Beta and Specific Gamma in Precipitation
February 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
VA: Lynchburg	1.14	0.35	Pb212	4.0 5.9
			Tl208	2.9 2.9
WA: Olympia	0.89	0.33	Pb212	6.4 6.1

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	$\pm 2u$	Nuclide	pCi/L $\pm 2u$
AL: Montgomery/408	1.73	0.42	Be7	50 43
			K40	52 32
AR: Little Rock	1.71	0.37	Be7	77 42
			K40	35 49
			Tl208	3.3 4.2
AZ: Phoenix	1.36	0.37		ND
CA: Richmond	0.14	0.27		ND
CO: Denver	15.1	1.0		ND
CT: Hartford	3.80	0.54		ND
DE: Wilmington	1.88	0.45	Pb212	4.9 6.6
FL: Jacksonville	1.93	0.44	Be7	55 35
GA: Atlanta	2.14	0.43	Be7	75 39
			Tl208	2.9 3.6
HI: Honolulu	0.49	0.30		ND
IA: Iowa City	0.64	0.32		ND
ID: Idaho Falls	1.46	0.38		ND
MA: Boston	2.40	0.46	Be7	79 31
			K40	29 35
MN: Minneapolis	6.12	0.69	Be7	36 21
NC: Charlotte	1.51	0.39		ND
NC: Wilmington	2.31	0.46		ND
ND: Bismarck	12.7	1.1	Be7	83 37
NY: Albany	4.88	0.63	Be7	41 28
			Tl208	2.1 3.3
NY: Yaphank	1.62	0.43	Tl208	2.4 4.2
OR: Portland	0.61	0.31		ND
PA: Harrisburg	0.68	0.37	Be7	34 24
TN: Knoxville	4.35	0.55	K40	29 36
TN: Nashville	1.56	0.43	Be7	72 34
TN: Oak Ridge/Melton	1.68	0.44	Be7	69 34
			Pb212	4.2 6.3
			Tl208	3.3 3.6
TX: Austin	2.27	0.44	Pb212	6.0 6.4
			Ra224	33 38
TX: Dallas	0.46	0.30	Be7	49 22
			K40	18 30
UT: Salt Lake City	1.11	0.36		ND

Note: ND = Not Detected

Table 7 (continued)
Gross Beta and Specific Gamma in Precipitation
March 2005

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
VA: Lynchburg	2.11	0.50		ND
WA: Olympia	0.54	0.29	Pb212	3.7 5.1
			Ra224	30 31

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2005

Location	January 2005		February 2005		March 2005	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery/408	-96	80	-57	80	44	82
AR: Little Rock	-32	84	23	86	35	82
AZ: Phoenix	-35	76	14	85	28	84
CA: Richmond	-6	78	-51	82	-8	82
CO: Denver	33	80	16	85	-23	85
CT: Hartford	-8	85	75	86	77	84
DE: Wilmington	NS		NS		82	84
FL: Jacksonville	-64	82	-40	81	26	81
GA: Atlanta	-8	85	-19	82	8	80
HI: Honolulu	-12	78	-24	83	-24	82
IA: Iowa City	-60	82	70	85	75	84
ID: Idaho Falls	NS		-35	82	-10	82
KS: Kansas City	8	78	-35	83	NS	
MA: Boston	-37	84	-28	82	32	81
MN: Minneapolis	47	80	56	87	52	83
NC: Charlotte	-26	84	14	84	84	84
NC: Wilmington	-56	82	NS		14	80
ND: Bismarck	NS		NS		51	83
NM: Santa Fe	-39	84	16	85	NS	
NV: Las Vegas/906	-2	78	-37	83	NS	
NY: Albany	8	86	-12	82	42	82
NY: Yaphank	-18	84	-44	81	65	83
OH: Painesville	42	87	-21	82	NS	
OR: Portland	41	80	-38	82	-57	80
PA: Harrisburg	-22	84	39	85	44	81
TN: Knoxville	0	85	-45	81	30	82
TN: Nashville	-8	85	-19	82	8	80
TN: Oak Ridge/Melton	153	92	162	89	84	85
TX: Austin	69	82	NS		30	81
TX: Dallas	-24	84	-2	84	16	83
TX: El Paso	-34	83	42	86	NS	
UT: Salt Lake City	31	80	12	85	12	83
VA: Lynchburg	-32	83	58	86	18	81
WA: Olympia	14	79	-82	77	-8	82

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 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 the 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 nuclides.

2. Drinking Water Program

The ERAMS 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 2005

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	01/04/05	-40	81
AL: Dothan	01/05/05	-8	82
AL: Montgomery	01/05/05	-30	83
AL: Muscle Shoals	01/11/05	66	86
AL: Scottsboro	01/10/05	-84	78
AR: Little Rock	01/10/05	-6	81
CA: Los Angeles	01/03/05	-84	80
CA: Richmond	02/03/05	31	79
CO: Denver	02/04/05	52	82
CT: Hartford	01/03/05	-4	83
DE: Dover	01/05/05	-10	82
FL: Tampa	03/31/05	-42	82
GA: Baxley	01/20/05	51	82
GA: Savannah	02/17/05	10	78
HI: Honolulu	01/06/05	38	84
IA: Cedar Rapids	02/02/05	24	81
ID: Boise	02/23/05	-43	75
ID: Idaho Falls	01/10/05	12	85
IL: Morris	01/13/05	9	84
IL: W. Chicago	01/04/05	38	86
IL: W. Chicago	03/24/05	-36	82
KS: Topeka	01/03/05	-46	82
LA: New Orleans	03/18/05	-36	82
MD: Baltimore	01/04/05	68	86
MD: Conowingo	03/01/05	-54	83
ME: Augusta	01/06/05	-24	80
MI: Detroit	02/10/05	116	84
MI: Grand Rapids	01/06/05	122	88
MN: Minneapolis	01/24/05	-14	79
MN: Red Wing	01/31/05	9	80
MO: Jefferson City	01/03/05	4	84
MS: Jackson	01/10/05	-5	84
MS: Port Gibson	01/11/05	28	85
MT: Helena	01/10/05	42	84
NC: Charlotte	01/12/05	410	100
NC: Raleigh	01/25/05	28	81
ND: Bismarck	01/03/05	-58	81
NE: Lincoln	01/07/05	4	82
NH: Concord	01/04/05	32	85
NJ: Trenton	01/03/05	77	88

Table 9 (continued)
Tritium in Drinking Water
January - March 2005

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NJ: Waretown	01/05/05	0	84
NV: Las Vegas	03/29/05	31	84
NY: Albany	01/04/05	60	86
NY: New York City	01/20/05	47	82
NY: Niagara Falls	01/04/05	118	90
NY: Syracuse	01/28/05	138	86
OH: Cincinnati	02/18/05	95	82
OH: E. Liverpool	03/09/05	-7	83
OH: Painesville	01/18/05	127	89
OH: Toledo	01/04/05	82	88
OK: Oklahoma City	02/07/05	66	83
OR: Portland	01/06/05	108	87
PA: Columbia	03/03/05	-40	81
PA: Harrisburg	03/02/05	-54	80
PA: Philadelphia - Baxter Cont. Lab.	02/03/05	2	80
PA: Philadelphia - Queen Lane Lab.	02/03/05	40	82
PA: Philadelphia - Belmont Lab.	02/03/05	87	83
PA: Pittsburgh	03/09/05	-16	83
RI: Providence	01/06/05	44	84
SC: Barnwell	01/31/05	144	86
SC: Columbia	01/06/05	2	82
SC: Jenkinsville	01/26/05	45	82
SC: Seneca	01/05/05	122	88
TN: Chattanooga	01/04/05	286	96
TN: Knoxville	01/12/05	-42	80
TN: Oak Ridge - Anderson Co. #772	01/07/05	10	82
TN: Oak Ridge - Knox Co. #371	01/07/05	-10	81
TN: Oak Ridge - Roane Co. #4442	01/07/05	76	85
TN: Oak Ridge - Anderson Co. #768	01/07/05	-42	80
TN: Oak Ridge - Roane Co. #360	01/07/05	-54	79
TX: Austin	01/27/05	-26	81
VA: Ashland	02/08/05	1830	140
VA: Lynchburg	01/10/05	-42	83
WA: Richland	01/17/05	63	86
WA: Seattle	02/09/05	77	83

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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 2005

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
AL: Montgomery	01/04/05	1.57	0.17	ND	ND	ND
AR: Little Rock	03/01/05	1.63	0.12	ND	ND	ND
AZ: Phoenix	03/31/05	1.67	0.12	ND	ND	ND
CA: Los Angeles	01/04/05	1.63	0.12	ND	ND	ND
CA: Sacramento	03/01/05	1.55	0.12	ND	ND	ND
CA: San Francisco	01/05/05	1.62	0.12	ND	ND	ND
CT: Hartford	01/31/05	1.54	0.12	ND	ND	ND
DE: Wilmington	01/11/05	1.67	0.13	ND	ND	ND
FL: Tampa	01/04/05	1.53	0.12	ND	ND	ND
GA: Atlanta	01/24/05	1.64	0.10	ND	ND	ND
HI: Honolulu	01/25/05	1.62	0.11	ND	ND	ND
IA: Des Moines	01/03/05	1.62	0.12	ND	ND	ND
IN: Indianapolis	01/12/05	1.51	0.13	ND	ND	ND
KS: Wichita	01/10/05	1.62	0.12	ND	ND	ND
KY: Louisville	01/10/05	1.62	0.11	ND	ND	ND
MA: Boston	03/09/05	1.61	0.12	ND	ND	ND
MD: Baltimore	01/07/05	1.62	0.12	ND	ND	ND
ME: Portland	02/02/05	1.60	0.13	ND	ND	ND
MO: Jefferson City	01/27/05	1.64	0.13	ND	ND	ND
NJ: Trenton	01/25/05	1.60	0.12	ND	ND	ND
NM: Albuquerque	01/05/05	1.51	0.13	ND	ND	ND
NV: Las Vegas	01/18/05	1.60	0.12	ND	ND	ND
NY: Buffalo	01/07/05	1.63	0.13	ND	ND	ND
NY: Syracuse	01/07/05	1.60	0.11	ND	ND	ND
OH: Cincinnati	02/01/05	1.63	0.13	ND	ND	ND
OH: Cleveland	02/09/05	1.62	0.12	ND	ND	ND
OR: Portland	01/04/05	1.57	0.17	ND	ND	ND
PA: Philadelphia	01/04/05	1.60	0.12	ND	ND	ND
PA: Pittsburgh	01/10/05	1.64	0.12	ND	ND	ND
TN: Chattanooga	01/25/05	1.69	0.14	ND	ND	ND
TN: Knoxville	02/10/05	1.62	0.12	ND	ND	ND
TX: Austin	01/11/05	1.39	0.11	ND	ND	ND
TX: Ft. Worth	02/01/05	1.64	0.12	ND	ND	ND
WA: Seattle	03/25/05	1.62	0.11	ND	ND	ND
WV: Charleston	01/04/05	1.57	0.13	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 ERAMS and the data that are generated should be directed as follows:

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