

ENVIRONMENTAL

RADIATION

DATA

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United States Environmental Protection Agency

Office of Radiation and Indoor Air

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Contents

	Page
List of Tables	v
Preface	vii
Acknowledgments	ix
Data Reporting Conventions	xi
1. Air Program	1
Airborne Particulates and Precipitation	1
Plutonium and Uranium in Airborne Particulates and Precipitation	12
2. Drinking Water Program	13
3. Milk Program	17
Pasteurized Milk	17

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List of Tables

Table	Page
1 Reporting Units and Minimum Detectable Concentrations	xiii
2 Gross Beta in Airborne Particulates: January 2004	2
3 Gross Beta in Airborne Particulates: February 2004	4
4 Gross Beta in Airborne Particulates: March 2004	6
5 Gross Beta and Specific Gamma in Precipitation: January 2004	8
6 Gross Beta and Specific Gamma in Precipitation: February 2004	9
7 Gross Beta and Specific Gamma in Precipitation: March 2004	10
8 Tritium in Precipitation: January - March 2004	11
9 Tritium in Drinking Water: January - March 2004	14
10 Radionuclides in Pasteurized Milk: January - March 2004	18

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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 2004

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	9	0.1	0.0	0.0	0.021	0.006	0.013
AL: Montgomery/411	9	0.1	0.0	0.0	0.023	0.007	0.015
AR: Little Rock	5	0.1	0.0	0.0	0.028	0.009	0.019
AZ: Phoenix	4	0.7	0.2	0.3	0.031	0.013	0.022
CA: Los Angeles	9	0.5	0.2	0.3	0.033	0.008	0.019
CO: Denver	8	0.8	0.1	0.4	0.035	0.005	0.015
CT: Hartford	9	0.1	0.0	0.0	0.012	0.003	0.008
DE: Wilmington	6	0.1	0.0	0.0	0.014	0.004	0.009
FL: Jacksonville	9	0.2	0.0	0.1	0.014	0.005	0.009
GA: Atlanta	7	0.1	0.0	0.1	0.025	0.011	0.017
HI: Honolulu	5	0.0	0.0	0.0	0.004	0.002	0.003
IA: Iowa City	9	0.4	0.0	0.2	0.028	0.011	0.020
ID: Idaho Falls	8				0.052	0.004	0.022
IN: Indianapolis	9	0.3	0.0	0.1	0.016	0.006	0.011
KS: Kansas City	7	1.9	0.3	1.1	0.032	0.017	0.020
KS: Topeka	8	1.2	0.1	0.5	0.038	0.018	0.024
ME: Augusta	4	0.1	0.0	0.0	0.017	0.010	0.014
MI: Lansing	8	0.1	0.0	0.0	0.017	0.007	0.013
MN: Minneapolis	4	0.2	0.1	0.1	0.021	0.015	0.019
MS: Jackson	8	0.2	0.0	0.1	0.024	0.009	0.018
NC: Charlotte	9	0.1	0.0	0.0	0.018	0.007	0.011
NC: Wilmington	3				0.014	0.009	0.012
ND: Bismarck	6	0.5	0.1	0.2	0.039	0.021	0.029
NH: Concord	9	0.1	0.0	0.1	0.013	0.006	0.011
NJ: Trenton	9	0.2	0.0	0.1	0.017	0.005	0.011
NV: Las Vegas/906	6	0.2	0.0	0.1	0.027	0.009	0.018
NV: Las Vegas/913	6	0.4	0.0	0.2	0.028	0.008	0.016
NY: Albany	4	0.0	0.0	0.0	0.012	0.007	0.009
NY: New York City	8	0.0	0.0	0.0	0.018	0.010	0.014
NY: Yaphank	9	0.1	0.0	0.0	0.013	0.005	0.009
OH: Painesville	8	0.1	0.0	0.1	0.017	0.007	0.012
OH: Ross	9				0.017	0.008	0.012
OR: Portland	6	0.2	0.0	0.1	0.016	0.001	0.008
PA: Harrisburg	9	0.2	0.0	0.1	0.016	0.007	0.012
PA: Pittsburgh	8	0.1	0.0	0.0	0.017	0.007	0.010
SC: Barnwell	1	0.0	0.0	0.0	0.015	0.015	0.015
SC: Columbia	5	1.1	0.0	0.3	0.028	0.013	0.017
SD: Pierre	8	1.7	0.1	0.4	0.024	0.013	0.019

Table 2 (continued)
Gross Beta in Airborne Particulates
January 2004

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Knoxville	6	0.1	0.0	0.0	0.020	0.015	0.018
TN: Nashville	9	0.1	0.0	0.1	0.022	0.007	0.015
TN: Oak Ridge/Bethel	7	0.3	0.0	0.2	0.018	0.008	0.012
TN: Oak Ridge/K25	7	0.3	0.0	0.2	0.018	0.009	0.013
TN: Oak Ridge/Melton	7	0.3	0.0	0.2	0.017	0.007	0.012
TN: Oak Ridge/Y12 E	7	0.2	0.0	0.1	0.021	0.009	0.014
TN: Oak Ridge/Y12 W	7	0.1	0.0	0.1	0.020	0.010	0.014
TX: Austin	8	0.4	0.1	0.2	0.038	0.011	0.019
TX: Dallas	7	0.6	0.1	0.4	0.032	0.009	0.023
TX: El Paso	7	2.8	0.5	1.1	0.035	0.012	0.024
UT: Salt Lake City	9	0.1	0.0	0.0	0.042	0.005	0.022
VA: Lynchburg	8	0.2	0.0	0.1	0.016	0.006	0.010
WA: Olympia	9	0.1	0.0	0.0	0.013	0.001	0.006
WA: Spokane	8	0.2	0.0	0.1	0.028	0.003	0.017

Table 3
Gross Beta in Airborne Particulates
February 2004

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AK: Anchorage	1	0.0	0.0	0.0	0.005	0.005	0.005
AL: Montgomery	8	0.1	0.0	0.0	0.014	0.009	0.012
AL: Montgomery/411	8	0.1	0.0	0.1	0.017	0.010	0.013
AR: Little Rock	4	0.0	0.0	0.0	0.029	0.013	0.021
AZ: Phoenix	4	0.7	0.1	0.4	0.022	0.010	0.015
CA: Los Angeles	8	0.3	0.0	0.2	0.016	0.003	0.008
CO: Denver	8	0.6	0.1	0.3	0.017	0.005	0.010
CT: Hartford	8	0.1	0.0	0.0	0.011	0.005	0.009
DC: Washington	4	0.1	0.0	0.0	0.015	0.008	0.012
DE: Wilmington	8	0.1	0.0	0.1	0.014	0.008	0.011
FL: Jacksonville	8	0.1	0.0	0.0	0.012	0.005	0.007
GA: Atlanta	5	0.2	0.0	0.1	0.020	0.015	0.017
HI: Honolulu	8	0.1	0.0	0.1	0.004	0.001	0.003
IA: Iowa City	8	0.1	0.0	0.1	0.036	0.012	0.022
ID: Idaho Falls	8				0.022	0.005	0.011
IN: Indianapolis	8	0.3	0.0	0.1	0.023	0.010	0.014
KS: Kansas City	5	1.0	0.2	0.4	0.040	0.010	0.024
KS: Topeka	4	1.3	0.2	0.6	0.032	0.017	0.022
ME: Augusta	4	0.1	0.0	0.1	0.014	0.008	0.011
MI: Lansing	8	0.1	0.0	0.0	0.020	0.013	0.017
MN: Minneapolis	4	0.1	0.1	0.1	0.029	0.013	0.021
MS: Jackson	7	0.1	0.0	0.1	0.019	0.009	0.014
NC: Charlotte	7	0.1	0.0	0.0	0.014	0.009	0.011
NC: Wilmington	3				0.011	0.009	0.010
ND: Bismarck	6	0.8	0.0	0.2	0.032	0.017	0.024
NH: Concord	8	0.1	0.0	0.1	0.016	0.006	0.011
NJ: Trenton	5	0.1	0.1	0.1	0.014	0.009	0.012
NV: Las Vegas/906	5	0.1	0.0	0.1	0.014	0.002	0.006
NV: Las Vegas/913	2	0.2	0.0	0.1	0.007	0.001	0.004
NY: Albany	4	0.0	0.0	0.0	0.016	0.008	0.012
NY: New York City	5	0.0	0.0	0.0	0.021	0.010	0.016
NY: Yaphank	8	0.0	0.0	0.0	0.014	0.005	0.010
OH: Painesville	7	0.1	0.0	0.1	0.021	0.013	0.017
OH: Ross	8				0.023	0.012	0.016
OR: Portland	8	0.4	0.0	0.1	0.009	0.001	0.004
PA: Harrisburg	8	0.1	0.0	0.1	0.018	0.009	0.014
PA: Pittsburgh	8	0.1	0.0	0.0	0.018	0.008	0.014
SC: Columbia	2	0.1	0.1	0.1	0.016	0.014	0.015

Table 3 (continued)
Gross Beta in Airborne Particulates
February 2004

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
SD: Pierre	7	0.3	0.1	0.1	0.036	0.010	0.020
TN: Knoxville	6	0.2	0.0	0.1	0.031	0.013	0.021
TN: Nashville	8	0.2	0.1	0.1	0.025	0.009	0.017
TN: Oak Ridge/Bethel	7	0.3	0.1	0.2	0.017	0.011	0.014
TN: Oak Ridge/K25	7	0.4	0.1	0.3	0.018	0.010	0.014
TN: Oak Ridge/Melton	7	0.2	0.1	0.2	0.016	0.009	0.014
TN: Oak Ridge/Y12 E	7	0.3	0.1	0.2	0.019	0.011	0.015
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.017	0.011	0.015
TX: Austin	8	0.2	0.1	0.2	0.021	0.008	0.015
TX: Dallas	6	0.2	0.0	0.1	0.026	0.012	0.020
TX: El Paso	7	1.3	0.3	0.8	0.022	0.008	0.014
UT: Salt Lake City	6	0.1	0.0	0.0	0.027	0.008	0.013
VA: Lynchburg	8	0.6	0.1	0.2	0.013	0.007	0.010
WA: Olympia	8	0.1	0.0	0.1	0.006	0.001	0.004
WA: Spokane	8	0.3	0.1	0.1	0.017	0.003	0.010

Table 4
Gross Beta in Airborne Particulates
March 2004

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AK: Anchorage	1	0.0	0.0	0.0	0.002	0.002	0.002
AL: Montgomery	8	0.1	0.0	0.0	0.013	0.006	0.009
AL: Montgomery/411	7	0.2	0.0	0.1	0.014	0.006	0.009
AR: Little Rock	7	0.0	0.0	0.0	0.014	0.005	0.010
AZ: Phoenix	5	0.6	0.1	0.3	0.021	0.007	0.015
CA: Los Angeles	9	0.3	0.0	0.2	0.020	0.004	0.012
CO: Denver	9	1.4	0.3	0.6	0.016	0.008	0.010
CT: Hartford	9	0.1	0.0	0.0	0.011	0.006	0.008
DC: Washington	9	0.0	0.0	0.0	0.012	0.004	0.008
DE: Wilmington	9	0.1	0.0	0.1	0.013	0.005	0.009
FL: Jacksonville	9	0.1	0.0	0.1	0.010	0.006	0.007
GA: Atlanta	8	0.5	0.0	0.1	0.022	0.009	0.014
HI: Honolulu	5	0.1	0.0	0.1	0.005	0.002	0.003
IA: Iowa City	9	0.3	0.1	0.2	0.021	0.009	0.013
ID: Idaho Falls	9				0.013	0.003	0.009
IN: Indianapolis	9	0.3	0.0	0.2	0.011	0.007	0.009
KS: Kansas City	8	2.0	0.3	0.8	0.016	0.007	0.011
KS: Topeka	7	1.0	0.2	0.5	0.015	0.008	0.012
ME: Augusta	3	0.1	0.0	0.0	0.013	0.010	0.012
MI: Lansing	9	0.2	0.0	0.1	0.022	0.008	0.012
MN: Minneapolis	5	0.1	0.0	0.1	0.017	0.009	0.014
MS: Jackson	6	0.3	0.0	0.1	0.017	0.008	0.012
NC: Charlotte	9	0.1	0.0	0.0	0.017	0.008	0.011
NC: Wilmington	3				0.010	0.008	0.009
ND: Bismarck	6	1.0	0.0	0.3	0.034	0.012	0.018
NH: Concord	9	0.2	0.1	0.1	0.013	0.008	0.010
NJ: Trenton	9	0.3	0.0	0.1	0.015	0.005	0.010
NV: Las Vegas	2	0.3	0.2	0.2	0.015	0.013	0.014
NV: Las Vegas/913	2	0.4	0.2	0.3	0.013	0.012	0.013
NY: Albany	5	0.0	0.0	0.0	0.012	0.010	0.011
NY: New York City	6	0.0	0.0	0.0	0.014	0.007	0.011
NY: Yaphank	9	0.1	0.0	0.0	0.016	0.007	0.009
OH: Painesville	7	0.1	0.1	0.1	0.015	0.009	0.012
OH: Ross	9				0.019	0.010	0.013
OR: Portland	7	0.0	0.0	0.0	0.005	0.003	0.004
PA: Harrisburg	9	0.3	0.0	0.2	0.015	0.006	0.011
PA: Pittsburgh	9	0.1	0.0	0.1	0.013	0.006	0.010
SC: Columbia	4	0.1	0.0	0.0	0.015	0.008	0.012

Table 4 (continued)
Gross Beta in Airborne Particulates
March 2004

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
SD: Pierre	8	0.8	0.0	0.2	0.023	0.006	0.011
TN: Knoxville	6	0.1	0.0	0.1	0.020	0.013	0.017
TN: Nashville	9	0.2	0.1	0.1	0.015	0.008	0.011
TN: Oak Ridge/Bethel	9	0.5	0.1	0.3	0.013	0.007	0.010
TN: Oak Ridge/K25	9	0.5	0.1	0.3	0.013	0.007	0.010
TN: Oak Ridge/Melton	9	0.4	0.0	0.2	0.014	0.006	0.010
TN: Oak Ridge/Y12 E	9	0.5	0.1	0.2	0.015	0.007	0.011
TN: Oak Ridge/Y12 W	9	0.2	0.1	0.2	0.015	0.009	0.012
TX: Austin	5	0.3	0.1	0.2	0.013	0.006	0.008
TX: Dallas	7	0.4	0.0	0.2	0.015	0.006	0.010
TX: El Paso	9	1.1	0.3	0.7	0.018	0.009	0.012
UT: Salt Lake City	5	0.3	0.0	0.2	0.016	0.011	0.013
VA: Lynchburg	8	0.6	0.1	0.3	0.014	0.006	0.009
WA: Olympia	9	0.1	0.0	0.0	0.004	0.001	0.003
WA: Spokane	9	0.5	0.1	0.2	0.010	0.003	0.007

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.98	0.34	Be7	38 16
AR: Little Rock	0.67	0.33		ND
AZ: Phoenix	1.61	0.39	Pb212	3.5 4.9
CA: Berkeley	0.10	0.32		ND
CT: Hartford	2.51	0.45	Be7	50 17
FL: Jacksonville	1.27	0.42	Be7	44 17
			Tl208	1.3 1.5
HI: Honolulu	0.72	0.37		ND
IA: Iowa City	2.60	0.44		ND
ID: Idaho Falls	0.73	0.34		ND
MN: Minneapolis	3.75	0.76	Be7	212 40
			K40	57 27
			Pb212	6.2 6.3
NC: Charlotte	2.59	0.46	Be7	100 48
ND: Bismarck	1.16	0.40	Be7	17 10
			Pb212	1.6 1.1
NY: Albany	0.62	0.33	Be7	21 16
NY: Yaphank	1.59	0.39	Be7	38 32
OH: Painesville	0.18	0.34		ND
OR: Portland	1.35	0.37	Be7	63 28
PA: Harrisburg	1.09	0.37	Be7	73 43
TN: Knoxville	3.01	0.48		ND
TN: Nashville	0.52	0.32		ND
TX: Austin	0.44	0.33		ND
TX: Dallas	0.30	0.34		ND
TX: El Paso	1.00	0.40	Be7	30 27
			K40	24 35
UT: Salt Lake City	2.14	0.49	Be7	29.6 8.3
			Pb212	2.1 1.3
VA: Lynchburg	0.92	0.34	K40	27 34
WA: Olympia	0.19	0.32		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.91	0.30	Be7	26.6 8.8
AR: Little Rock	1.70	0.36	Be7	37 16
AZ: Phoenix	0.75	0.30		ND
CA: Berkeley	0.47	0.28		ND
CO: Denver	0.92	0.33		ND
CT: Hartford	1.02	0.32	Be7	27 15
FL: Jacksonville	2.02	0.38	Be7	56 15
HI: Honolulu	0.87	0.33	Be7	29 24
			Bi212	32 45
IA: Iowa City	1.28	0.34	Pb212	2.5 2.7
ID: Idaho Falls	0.65	0.30	Be7	11.5 8.6
MN: Minneapolis	5.56	0.60	Be7	31 14
NC: Charlotte	2.14	0.37	Be7	40 14
			Pb212	2.6 3.0
ND: Bismarck	0.28	0.25	Be7	18 15
			Pb212	3.4 4.2
NY: Albany	1.93	0.41	Be7	24 15
OR: Portland	0.42	0.27	Pb212	5.2 7.5
PA: Harrisburg	1.31	0.33		ND
TN: Knoxville	0.80	0.29		ND
TN: Nashville	0.83	0.29	Pb212	4.4 6.3
			Ra224	43 40
TX: Austin	0.80	0.32	Be7	21 15
TX: Dallas	1.44	0.36	Be7	28 15
UT: Salt Lake City	0.88	0.34		ND
WA: Olympia	0.39	0.27	Be7	11.4 6.9

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.69	0.38	Be7	45 10
			Pb212	1.3 1.2
			Tl208	0.57 0.59
AR: Little Rock	1.22	0.32	Be7	46 18
AZ: Phoenix	3.64	0.47		ND
CA: Berkeley	0.16	0.24		ND
CO: Denver	2.76	0.43	Be7	41 21
CT: Hartford	3.75	0.53	Be7	41 17
DE: Wilmington	1.56	0.40	Be7	45 17
FL: Jacksonville	1.06	0.35		ND
HI: Honolulu	0.65	0.30		ND
	1.28	0.36	K40	22 35
IA: Iowa City	0.54	0.35	Be7	13 13
MN: Minneapolis	1.02	0.42	Be7	23 14
			K40	8 12
NC: Charlotte	-0.10	0.33	Pb210	70 100
ND: Bismarck	2.50	0.45	Pb212	3.8 4.5
NY: Albany	0.97	0.35	Be7	31 14
NY: Yaphank	1.08	0.38	Be7	39 26
OH: Painesville	6.07	0.59	Be7	114 19
			Tl208	1.2 1.2
OR: Portland	0.46	0.26		ND
TN: Knoxville	3.52	0.48		ND
TN: Nashville	0.69	0.35	Be7	39 12
TX: Austin	1.05	0.32	Be7	38 29
TX: Dallas	0.73	0.29	Be7	21.9 9.6
TX: El Paso	0.64	0.29		ND
UT: Salt Lake City	1.75	0.38		ND
WA: Olympia	0.15	0.25		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2004

Location	January 2004		February 2004		March 2004	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	26	74	76	76	-35	78
AR: Little Rock	44	77	-7	72	-16	79
AZ: Phoenix	6	75	13	73	-18	79
CA: Berkeley	55	77	54	75	67	79
CO: Denver	NS		4	72	-2	79
CT: Hartford	125	78	-24	71	32	81
DE: Wilmington	NS		NS		24	81
FL: Jacksonville	29	74	-9	72	-5	79
HI: Honolulu	29	76	26	74	-26	75
IA: Iowa City	45	75	11	73	45	81
ID: Idaho Falls	34	76	75	81	NS	
MN: Minneapolis	102	77	22	73	-3	80
NC: Charlotte	71	76	13	73	-16	79
ND: Bismarck	79	76	11	73	-19	79
NY: Albany	70	76	52	75	6	80
NY: Yaphank	66	75	NS		-23	79
OH: Painesville	63	77	NS		19	80
OR: Portland	80	78	-11	72	-19	75
PA: Harrisburg	78	76	-7	72	NS	
TN: Knoxville	41	75	62	75	-64	77
TN: Nashville	7	74	32	74	-71	76
TX: Austin	-3	73	75	76	-8	79
TX: Dallas	-16	74	-43	70	37	81
TX: El Paso	32	74	NS		27	81
UT: Salt Lake City	76	78	-4	72	-19	79
VA: Lynchburg	55	75	NS		NS	
WA: Olympia	73	77	32	79	-77	73

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 2004

Location	Date Collected	³ H pCi/L ± 2u
AK: Fairbanks	01/13/04	-8 76
AL: Dothan	01/13/04	43 76
AL: Montgomery	01/20/04	53 76
AL: Muscle Shoals	01/08/04	43 76
AL: Scottsboro	01/09/04	106 79
AR: Little Rock	01/15/04	187 82
CA: Los Angeles	01/13/04	7 78
CA: Richmond	03/17/04	-71 73
CO: Denver	01/13/04	48 76
CT: Hartford	01/13/04	74 77
DE: Dover	01/12/04	27 75
FL: Tampa	02/26/04	81 78
GA: Baxley	01/21/04	8 77
GA: Savannah	03/07/04	-21 76
HI: Honolulu	01/13/04	0 74
IA: Cedar Rapids	02/24/04	93 78
ID: Boise	03/01/04	53 80
ID: Idaho Falls	01/23/04	39 78
IL: Morris	01/13/04	34 75
IL: W. Chicago	01/28/04	-8 76
KS: Topeka	01/09/04	15 80
LA: New Orleans	03/17/04	97 81
MD: Baltimore	01/13/04	3 74
MD: Conowingo	02/17/04	-14 73
ME: Augusta	01/08/04	15 80
MI: Detroit	01/13/04	152 80
MI: Grand Rapids	01/16/04	85 80
MN: Minneapolis	01/26/04	18 77
MN: Red Wing	01/20/04	-13 76
MO: Jefferson City	01/16/04	-11 76
MS: Jackson	01/14/04	55 76
MS: Port Gibson	01/13/04	2 74
MT: Helena	01/16/04	18 74
NC: Charlotte	01/14/04	214 82
NC: Raleigh	01/13/04	32 75
ND: Bismarck	01/12/04	83 83
NE: Lincoln	01/12/04	-11 80
NH: Concord	01/12/04	55 76
NJ: Trenton	01/21/04	-18 76
NJ: Waretown	01/21/04	-5 77

Table 9 (continued)
Tritium in Drinking Water
January - March 2004

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NM: Santa Fe	02/11/04	86	77
NV: Las Vegas	03/31/04	43	78
NY: Albany	01/12/04	44	77
NY: New York City	02/26/04	82	78
NY: Syracuse	01/20/04	84	80
OH: Cincinnati	03/01/04	19	78
OH: E. Liverpool	02/11/04	51	76
OH: Painesville	01/12/04	56	76
OH: Toledo	01/12/04	118	80
OK: Oklahoma City	01/12/04	58	76
OR: Portland	01/16/04	-2	77
PA: Columbia	02/19/04	63	77
PA: Harrisburg	02/18/04	2	74
PA: Philadelphia - Belmont	02/18/04	65	77
PA: Philadelphia - Baxter	02/18/04	74	77
PA: Philadelphia - Queen Lane Lab	02/18/04	19	75
PA: Pittsburgh	02/11/04	27	74
RI: Providence	01/14/04	-39	75
SC: Barnwell	01/28/04	24	77
SC: Columbia	01/14/04	79	77
SC: Jenkinsville	01/14/04	87	78
SC: Seneca	01/12/04	54	83
TN: Chattanooga	01/09/04	68	77
TN: Knoxville	01/14/04	-6	74
TN: Oak Ridge - Roane Co. #360	03/19/04	34	78
TN: Oak Ridge - Knox Co. #371	03/22/04	-37	75
TN: Oak Ridge - Anderson Co. #768	03/22/04	-9	76
TN: Oak Ridge - Roane Co. #4442	03/30/04	261	88
TN: Oak Ridge - Anderson Co. #772	03/30/04	-22	75
TX: Austin	01/28/04	59	76
VA: Ashland	01/09/04	-4	74
VA: Lynchburg	01/12/04	-19	73
WA: Richland	01/15/04	29	77
WA: Seattle	02/24/04	50	76

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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 2004

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	01/13/04	1.54	0.13	ND	ND	ND
AR: Little Rock	03/02/04	1.66	0.12	ND	ND	ND
AZ: Phoenix	01/26/04	1.51	0.12	ND	ND	ND
CA: Los Angeles	01/15/04	1.55	0.12	ND	ND	ND
CA: Sacramento	01/15/04	1.76	0.12	ND	ND	ND
CA: San Francisco	01/15/04	1.67	0.13	ND	ND	ND
DE: Dover	01/20/04	1.49	0.13	ND	ND	ND
FL: Tampa	01/12/04	1.67	0.13	ND	ND	ND
GA: Atlanta	01/27/04	1.42	0.12	ND	ND	ND
HI: Honolulu	03/08/04	1.50	0.12	ND	ND	ND
IA: Des Moines	01/15/04	1.66	0.12	ND	ND	ND
IN: Indianapolis	01/12/04	1.63	0.13	ND	ND	ND
KS: Wichita	01/12/04	1.70	0.13	ND	ND	ND
MA: Boston	03/15/04	1.56	0.12	ND	ND	ND
MD: Baltimore	01/16/04	1.66	0.12	ND	ND	ND
ME: Augusta	02/12/04	1.57	0.12	ND	ND	ND
ME: Portland	01/06/04	1.68	0.12	ND	ND	ND
MI: Grand Rapids	01/14/04	1.72	0.12	ND	ND	ND
MO: Jefferson City	01/14/04	1.63	0.12	ND	ND	ND
NJ: Trenton	01/23/04	1.64	0.12	ND	ND	ND
NV: Las Vegas	01/12/04	1.63	0.12	ND	ND	ND
NY: Buffalo	01/12/04	1.66	0.12	ND	ND	ND
NY: Syracuse	01/14/04	1.64	0.12	ND	ND	ND
OH: Cincinnati	01/20/04	1.57	0.12	ND	ND	ND
OH: Cleveland	02/09/04	1.50	0.13	ND	ND	ND
OR: Portland	02/02/04	1.54	0.16	ND	ND	ND
PA: Philadelphia	01/12/04	1.66	0.13	ND	ND	ND
PA: Pittsburgh	02/02/04	1.43	0.16	ND	ND	ND
TN: Chattanooga	01/12/04	1.58	0.12	ND	ND	ND
TN: Knoxville	01/13/04	1.63	0.11	ND	ND	ND
TN: Memphis	02/23/04	1.63	0.12	ND	ND	ND
TX: Ft. Worth	02/24/04	1.66	0.12	ND	ND	ND
TX: San Antonio	01/12/04	1.38	0.16	ND	ND	ND
VA: Norfolk	03/10/04	1.55	0.12	ND	ND	ND
VT: Montpelier	03/29/04	1.57	0.11	ND	ND	ND
WA: Spokane	01/26/04	1.63	0.12	ND	ND	ND
WA: Tacoma	03/31/04	1.66	0.13	ND	ND	ND
WV: Charleston	01/12/04	1.64	0.12	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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