United States
Environmental Protection
Agency

National Air and Radiation
Environmental Laboratory
540 South Morris Avenue
Montgomery, AL 36115-2601

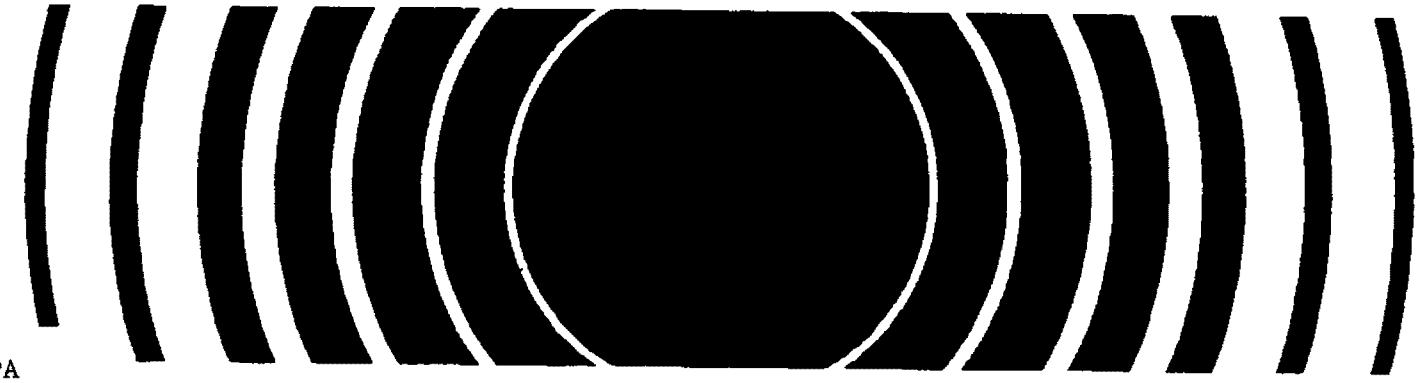
EPA 402-R-93-090
October 1993

Radiation

EPA

Environmental Radiation Data Report 71

July-September 1992



ENVIRONMENTAL RADIATION DATA

REPORT 71

July–September 1992

United States Environmental Protection Agency

Office of Radiation and Indoor Air

Preface

Environmental Radiation Data (ERD) is compiled and distributed 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). Data from similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in the ERD when available.

ERAMS was established in 1973 by the United States Environmental Protection Agency. It is comprised of a nationwide network of sampling stations that provide air, surface and drinking water, and milk samples from which environmental radiation levels are derived. The major emphasis for ERAMS is upon identifying trends in the accumulation of long-lived radionuclides in the environment.

Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the environment. The radiation analyses performed on these samples include gross alpha and gross beta levels, gamma analyses for fission products, and specific analyses for uranium, plutonium, strontium, iodine, radium, krypton, 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 *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual* (EPA 520/5–84–006). Station operation and sample collection are in accordance with procedures contained in the *ERAMS Manual* (EPA 520/5–84–007, 008, 009).

Contents

Tables

Data Reporting Rationale

Frequently, there is little or no radioactivity in environmental media. Thus, the results of laboratory analyses should show a distribution of negative and positive numbers about zero. A negative value occurs when a previously determined background value is subtracted from a sample value that is less than that of the background. From July 1975 to March 1991, ERAMS data were reported as calculated, whether the results were negative, zero, or positive. Since April 1991, negative results have been denoted as "not detectable," or "ND." For gamma analyses only, results less than the 2σ counting error are also denoted as "not detectable."

All data are stored in the NAREL sample database as generated, and these values are available for statistical evaluation. However, caution should be exercised in the use of the data in this report for statistical analysis, since the removal of negative numbers produces a positive bias in the distribution of results.

Reported Error Terms

Each reported value for specific analyses will be accompanied by a counting error term at the 2σ (95%) confidence level. Error terms are therefore reported as counting errors. At the very low levels characteristic of most ERAMS measurements, counting error is the greatest contributor to overall error.

Significant Figures

No more than three significant figures will be reported. A datum that contains more than three figures will be rounded off to three figures.

Reporting Levels

The reporting units, smallest increments for reporting, and typical minimum detectable levels (MDL's) for each isotope are shown in Table 1. MDL is defined as the 3σ error of the background. Reporting increments are sometimes considerably smaller than MDL's to avoid truncation errors in averaging.

Averages

Averages will be calculated along with appropriate error terms in an annual summary and analysis of ERAMS data. In calculating these averages, all values of individual data, including negative numbers, will be utilized. Averages will not be included in ERD quarterly reports.

Table 1

ERAMS Reporting Increments and Minimum Detectable Levels for Radionuclide Analyses

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Gross Alpha	Water	pCi/L	1 pCi/L	2 pCi/L
† Gross Beta	Air	pCi/m^3	0.01 pCi/m^3	0.01 pCi/m^3
	Water	pCi/L	1 pCi/L	1 pCi/L
	Precipitation	nCi/m^2	0.01 nCi/m^2	0.01 nCi/m^2
	(specific radiochemical analyses)			
Tritium	Water	nCi/L	0.1 nCi/L	0.2 nCi/L
	Milk	nCi/L	0.1 nCi/L	0.2 nCi/L
Carbon-14	Milk	pCi/L	1 pCi/L	15 pCi/L
Krypton-85	Ambient Air	pCi/m^3	0.1 pCi/m^3	2 pCi/m^3
†† Plutonium-238,239,240	Air	aCi/m^3	0.1 aCi/m^3	0.015 pCi
	Milk	pCi/L	0.001 pCi/L	0.015 pCi
	Water	pCi/L	0.001 pCi/L	0.015 pCi
‡ Uranium-234,235,238	Air	aCi/m^3	0.1 aCi/m^3	0.015 pCi
	Milk	pCi/L	0.001 pCi/L	0.015 pCi
	Water	pCi/L	0.001 pCi/L	0.015 pCi
Radium-226	Water	pCi/L	0.1 pCi/L	0.1 pCi/L
Strontium-90	Milk	pCi/L	0.1 pCi/L	1 pCi/L
	Water	pCi/L	0.1 pCi/L	1 pCi/L
‡‡ Strontium-89	Milk	pCi/L	1 pCi/L	5 pCi/L
‡‡ Iodine-131	Milk	pCi/L	1 pCi/L	10 pCi/L
	Water	pCi/L	1 pCi/L	10 pCi/L
	Water	pCi/L	0.1 pCi/L	0.4 pCi/L
Iodine-129	Milk	fCi/L	0.1 fCi/L	0.4 fCi/L
Cesium-137	Milk	pCi/L	1 pCi/L	10 pCi/L
	Water	pCi/L	1 pCi/L	10 pCi/L
‡‡ Barium-140	Milk	pCi/L	1 pCi/L	10 pCi/L
	Water	pCi/L	1 pCi/L	10 pCi/L
Potassium	Milk	g/L	0.1 g/L	0.12 g/L
	Water	g/L	0.1 g/L	0.12 g/L
Potassium-40	Water	pCi/L	1 pCi/L	100 pCi/L

† The value of MDL for precipitation in terms of nCi/m^2 would be dependent on precipitation (mm).

†† This value of MDL for air in terms of pCi/m^3 would be dependent on the air volume. Measurement by alpha spectroscopy that includes contributions of plutonium-239 and plutonium-240. MDL for all media given per sample.

‡ This value of MDL for air in terms of pCi/m^3 would be dependent on the air volume. MDL for all media given per sample.

‡‡ Activity as of the day of counting.

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, including present and potential sources of environmental radioactivity. Sampling sites are located 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† at 5 hours and 29 hours after collection to allow for radon and thoron daughter product 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 analyses in a low background beta counter. Gamma scans are performed on all filters showing gross beta counts greater than 1 pCi/m^3. The laboratory obtained values are usually lower than the field estimates due to the decay of naturally occurring radionuclides between the times of the two measurements.

Precipitation samples are collected at those field stations collecting air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements. A composite of the March, April, and May precipitation samples is analyzed for plutonium-238, -239, -240, and uranium-234, -235, and -238.

A compilation of individual measurements is available from the National Air and Radiation Environmental Laboratory, 540 South Morris Avenue, Montgomery, AL 36115-2601.

Tables 2–4 contain the data from airborne particulate samples for July–September 1992. Tables 5–7 contain the data from precipitation samples for July–September 1992. Table 8 contains the data from tritium in precipitation samples for July–September 1992 at the selected sites.

---

† The counts at five hours for the Montgomery, Alabama, station are performed on a low background beta counter.

Table 2

Gross Beta in Airborne Particulates

July 1992

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
AL:Montgomery	10	0.2	0.0	0.1	0.02	0.00	0.01
AR:Little Rock	8	0.3	0.1	0.2	0.02	0.00	0.01
AZ:Phoenix	4	0.7	0.0	0.3	0.01	0.01	0.01
CA:Berkeley	9	0.1	0.0	0.1	0.01	0.00	0.00
CA:Los Angeles	8	0.7	0.0	0.2	0.01	0.00	0.01
CO:Denver	9	0.8	0.2	0.5	0.01	0.01	0.01
CT:Hartford	8	0.1	0.1	0.1	0.01	0.00	0.00
DE:Wilmington	9	0.6	0.1	0.2	0.01	0.00	0.01
FL:Jacksonville	8	0.1	0.1	0.1	0.02	0.00	0.01
FL:Miami	9	0.1	0.0	0.0	0.02	0.01	0.01
HI:Honolulu	8	0.2	0.1	0.1	0.00	0.00	0.00
IA:Iowa City	9	0.2	0.1	0.1	0.02	0.00	0.01
ID:Boise	7	1.1	0.1	0.5	0.03	0.00	0.01
ID:Idaho Falls	9	0.0	0.0	0.0	0.01	0.01	0.01
IL:Chicago	9	0.6	0.1	0.2	0.01	0.00	0.01
IN:Indianapolis	9	0.9	0.0	0.2	0.02	0.01	0.01
KS:Topeka	9	1.0	0.1	0.4	0.01	0.00	0.01
KY:Frankfort	5	1.1	0.1	0.4	0.02	0.01	0.01
LA:New Orleans	9	0.2	0.0	0.1	0.03	0.01	0.02
MA:Lawrence	6	0.1	0.0	0.1	0.01	0.00	0.00
ME:Augusta	9	0.3	0.1	0.2	0.01	0.00	0.01
MI:Lansing	8	0.3	0.0	0.2	0.01	0.00	0.01
MN:Minneapolis	4	0.1	0.0	0.1	0.01	0.01	0.01
MO:Jefferson City	9	0.6	0.2	0.3	0.02	0.01	0.01
MS:Jackson	9	0.5	0.1	0.2	0.03	0.01	0.02
NC:Charlotte	8	0.2	0.1	0.2	0.02	0.01	0.01
NC:Wilmington	5	0.0	0.0	0.0	0.02	0.01	0.01
ND:Bismarck	8	1.0	0.2	0.5	0.01	0.00	0.01
NE:Lincoln	7	1.2	0.1	0.4	0.01	0.01	0.01
NH:Concord	9	0.2	0.0	0.1	0.01	0.00	0.00
NJ:Trenton	9	0.9	0.3	0.5	0.01	0.00	0.01
NM:Santa Fe	8	0.3	0.0	0.2	0.01	0.00	0.01
NV:Las Vegas	9	0.2	0.1	0.1	0.01	0.01	0.01
NY:Albany	5	0.1	0.0	0.0	0.01	0.00	0.01
NY:Niagara Falls	7	0.2	0.0	0.1	0.01	0.00	0.01
NY:Syracuse	1	0.2	0.2	0.2	0.01	0.01	0.01
NY:Yaphank	7	0.4	0.0	0.1	0.01	0.00	0.01

Table 2 (continued)

Gross Beta in Airborne Particulates

July 1992

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
OH:Columbus	5	0.1	0.1	0.1	0.01	0.01	0.01
OH:Painesville	7	0.4	0.0	0.1	0.01	0.01	0.01
OH:Ross	9	0.0	0.0	0.0	0.02	0.00	0.01
OH:Toledo	7	0.5	0.1	0.3	0.01	0.01	0.01
OR:Portland	8	0.0	0.0	0.0	0.01	0.00	0.00
PA:Harrisburg	9	0.5	0.2	0.3	0.01	0.00	0.01
RI:Providence	4	0.0	0.0	0.0	0.01	0.01	0.01
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	9	0.3	0.0	0.1	0.03	0.01	0.02
SD:Pierre	4	0.3	0.1	0.2	0.01	0.00	0.00
TN:Knoxville	7	0.9	0.3	0.5	0.02	0.01	0.01
TN:Nashville	9	0.6	0.1	0.2	0.02	0.01	0.01
TX:Austin	9	0.2	0.0	0.1	0.02	0.01	0.01
TX:El Paso	9	1.0	0.4	0.6	0.01	0.01	0.01
UT:Salt Lake City	9	0.4	0.0	0.2	0.02	0.00	0.01
VA:Lynchburg	8	0.9	0.2	0.6	0.02	0.01	0.01
VA:Virginia Beach	4	0.1	0.1	0.1	0.02	0.01	0.01
WA:Olympia	9	0.2	0.0	0.1	0.01	0.00	0.00
WA:Spokane	9	0.3	0.1	0.2	0.01	0.00	0.01
WI:Madison	9	0.4	0.1	0.2	0.01	0.00	0.01

Minimum Detectable Limit for field estimates – 0.1 pCi/m^3.

Minimum Detectable Limit for laboratory measurement – 0.01 pCi/m^3.

Table 4

Gross Beta in Airborne Particulates

September 1992

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
AK:Anchorage	6	0.1	0.0	0.0	0.01	0.00	0.01
AL:Montgomery	8	0.6	0.0	0.1	0.08	0.01	0.02
AR:Little Rock	5	0.4	0.1	0.3	0.01	0.01	0.01
AZ:Phoenix	5	0.6	0.2	0.5	0.02	0.01	0.01
CA:Berkeley	8	0.1	0.0	0.1	0.01	0.00	0.00
CA:Los Angeles	9	0.3	0.0	0.2	0.01	0.01	0.01
CO:Denver	8	0.8	0.4	0.7	0.01	0.01	0.01
CT:Hartford	7	0.1	0.1	0.1	0.01	0.00	0.01
DE:Wilmington	5	0.3	0.1	0.3	0.01	0.01	0.01
FL:Jacksonville	9	0.8	0.0	0.2	0.01	0.00	0.00
FL:Miami	4	0.1	0.0	0.0	0.01	0.00	0.00
IA:Iowa City	9	0.1	0.0	0.1	0.01	0.01	0.01
ID:Boise	9	0.4	0.0	0.2	0.01	0.00	0.01
ID:Idaho Falls	8	0.0	0.0	0.0	0.01	0.00	0.01
IL:Chicago	6	0.5	0.0	0.3	0.02	0.00	0.01
IN:Indianapolis	9	0.4	0.1	0.2	0.02	0.01	0.01
KS:Topeka	8	1.1	0.2	0.5	0.01	0.00	0.01
KY:Frankfort	4	0.9	0.1	0.3	0.01	0.01	0.01
LA:New Orleans	8	0.1	0.0	0.1	0.01	0.00	0.01
MA:Lawrence	9	0.1	0.0	0.0	0.02	0.01	0.01
ME:Augusta	8	0.4	0.0	0.2	0.02	0.00	0.01
MI:Lansing	8	0.3	0.1	0.1	0.02	0.01	0.01
MN:Minneapolis	4	0.2	0.0	0.1	0.01	0.01	0.01
MO:Jefferson City	8	0.6	0.2	0.4	0.02	0.00	0.01
MS:Jackson	9	0.5	0.1	0.2	0.02	0.01	0.01
NC:Charlotte	8	0.3	0.0	0.2	0.02	0.00	0.01
ND:Bismarck	7	0.8	0.2	0.6	0.01	0.00	0.01
NE:Lincoln	5	0.7	0.1	0.3	0.01	0.01	0.01
NH:Concord	9	0.5	0.0	0.2	0.02	0.00	0.01
NJ:Trenton	8	1.5	0.2	0.6	0.01	0.00	0.01
NM:Santa Fe	8	0.3	0.1	0.2	0.01	0.00	0.01
NV:Las Vegas	8	0.3	0.1	0.2	0.02	0.01	0.01
NY:Albany	5	0.1	0.0	0.0	0.01	0.00	0.01
NY:Niagara Falls	8	0.3	0.1	0.1	0.03	0.00	0.01
NY:Syracuse	3	0.5	0.0	0.2	0.01	0.00	0.01
NY:Yaphank	6	0.1	0.0	0.1	0.01	0.00	0.01
OH:Columbus	6	0.2	0.1	0.1	0.02	0.01	0.01

Table 4 (continued)

Gross Beta in Airborne Particulates

September 1992

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
OH:Painesville	9	0.8	0.0	0.2	0.03	0.00	0.01
OH:Ross	9	0.0	0.0	0.0	0.05	0.01	0.02
OH:Toledo	8	0.4	0.1	0.2	0.02	0.01	0.01
OR:Portland	9	0.0	0.0	0.0	0.01	0.00	0.01
PA:Harrisburg	8	1.2	0.1	0.4	0.02	0.00	0.01
RI:Providence	2	0.1	0.1	0.1	0.01	0.00	0.00
SC:Barnwell	1	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	9	0.5	0.1	0.2	0.02	0.00	0.01
SD:Pierre	2	0.3	0.2	0.3	0.01	0.01	0.01
TN:Knoxville	8	1.2	0.2	0.6	0.04	0.01	0.02
TN:Nashville	9	0.7	0.1	0.3	0.03	0.01	0.01
TX:Austin	8	0.2	0.1	0.2	0.01	0.01	0.01
TX:El Paso	8	1.2	0.5	0.7	0.02	0.00	0.01
UT:Salt Lake City	8	0.8	0.1	0.3	0.01	0.01	0.01
VA:Lynchburg	8	1.5	0.2	0.6	0.01	0.00	0.01
VA:Virginia Beach	1	0.0	0.0	0.0	0.01	0.01	0.01
WA:Olympia	8	0.2	0.0	0.1	0.01	0.00	0.00
WA:Spokane	7	0.6	0.2	0.3	0.01	0.01	0.01
WI:Madison	8	0.3	0.0	0.2	0.01	0.00	0.01

Minimum Detectable Limit for field estimates – 0.1 pCi/m^3.
Minimum Detectable Limit for laboratory measurement – 0.01 pCi/m^3.

Table 5

Gross Beta and Specific Gamma in Precipitation

July 1992

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L	$\pm 2\sigma$
AL:Montgomery	138.0	0.16	0.05	ND	
AR:Little Rock	120.0	0.12	0.03	ND	
AZ:Phoenix	19.0	0.01	0.01	ND	
CO:Denver	40.6	0.09	0.02	ND	
CT:Hartford	89.0	0.11	0.03	ND	
DE:Wilmington	71.0	0.10	0.02	ND	
FL:Jacksonville	67.4	0.05	0.02	ND	
FL:Miami	105.8	0.09	0.03	ND	
HI:Honolulu	49.0	0.07	0.02	ND	
ID:Idaho Falls	14.8	0.04	0.01	ND	
IL:Chicago	91.0	0.09	0.03	ND	
LA:New Orleans	110.6	0.08	0.03	ND	
ME:Augusta	102.0	0.38	0.05	ND	
MI:Lansing	108.6	0.24	0.04	ND	
MN:Minneapolis	64.0	0.04	0.02	ND	
MO:Jefferson City	179.0	0.11	0.05	ND	
MS:Jackson	84.0	0.10	0.03	ND	
NC:Charlotte	11.0	0.07	0.01	^{7}Be: 101±46	
NC:Wilmington	73.0	0.10	0.02	ND	
ND:Bismarck	77.8	0.06	0.02	ND	
NH:Concord	72.2	0.16	0.03	^{7}Be: 69.2±43.8 ^{214}Pb: 7.1±5.3	
NJ:Trenton	45.0	0.18	0.02	ND	
NM:Santa Fe	41.0	0.05	0.01	ND	
NY:Albany	70.6	0.25	0.03	ND	
NY:Niagara Falls	138.0	0.15	0.04	^{7}Be: 47.3±43.8	
NY:Syracuse	8.0	0.01	0.00	ND	
NY:Yaphank	114.0	0.29	0.04	ND	
OH:Painesville	207.0	0.39	0.08	ND	
OH:Toledo	150.0	0.18	0.05	ND	
OR:Portland	17.0	0.03	0.01	ND	
PA:Harrisburg	146.4	0.43	0.06	^{7}Be: 85.8±51.1	
SC:Barnwell	69.2	0.12	0.03	ND	
SC:Columbia	54.4	0.07	0.02	ND	
TN:Knoxville	87.0	0.11	0.03	ND	
TN:Nashville	127.0	0.16	0.04	ND	
TX:Austin	50.0	0.04	0.01	ND	
UT:Salt Lake City	6.0	0.02	0.00	ND	
VA:Lynchburg	76.4	0.34	0.04	ND	
WA:Olympia	14.4	0.01	0.00	ND	
WI:Madison	87.0	0.05	0.02	ND	

Table 6

Gross Beta and Specific Gamma in Precipitation

August 1992

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L	$\pm 2\sigma$
AK:Anchorage	1.2	0.00	0.00	^{7}Be: 64.1	53.5
AL:Montgomery	138.0	0.27	0.05	ND	
AR:Little Rock	42.0	0.06	0.01	ND	
AZ:Phoenix	34.0	0.03	0.01	ND	
CO:Denver	57.4	0.12	0.02	ND	
CT:Hartford	143.0	0.29	0.05	ND	
DE:Wilmington	70.0	0.14	0.03	ND	
FL:Jacksonville	151.4	0.13	0.04	ND	
FL:Miami	35.4	0.05	0.01	ND	
HI:Honolulu	19.0	0.03	0.01	ND	
IL:Chicago	34.2	0.03	0.01	ND	
LA:New Orleans	264.0	0.27	0.08	ND	
ME:Augusta	79.0	0.21	0.03	ND	
MI:Lansing	102.4	0.06	0.03	ND	
MN:Minneapolis	89.0	0.06	0.03	ND	
MO:Jefferson City	21.0	0.01	0.01	^{40}K: 83.4	23.8
MS:Jackson	42.0	0.01	0.01	ND	
NC:Charlotte	124.0	0.22	0.04	ND	
NC:Wilmington	159.0	0.29	0.06	ND	
ND:Bismarck	23.6	0.02	0.01	ND	
NH:Concord	73.4	0.23	0.03	ND	
NJ:Trenton	67.6	0.17	0.03	ND	
NM:Santa Fe	25.0	0.05	0.01	ND	
NY:Albany	190.4	0.71	0.09	^{7}Be: 90.9	39.6
NY:Niagara Falls	40.0	0.15	0.02	ND	
NY:Syracuse	30.0	0.03	0.01	ND	
NY:Yaphank	96.0	0.17	0.03	ND	
OH:Painesville	146.8	0.35	0.06	ND	
OH:Toledo	68.0	0.13	0.03	ND	
OR:Portland	5.8	0.00	0.00	^{7}Be: 37.4	28.5
PA:Harrisburg	39.2	0.08	0.01	^{7}Be: 58.6	30.6
SC:Barnwell	144.6	0.13	0.04	ND	
SC:Columbia	143.2	0.08	0.04	ND	
TN:Knoxville	81.0	0.19	0.03	ND	
TN:Nashville	131.8	0.13	0.04	ND	
TX:Austin	70.0	0.05	0.02	ND	
TX:El Paso	42.0	0.04	0.01	ND	
VA:Lynchburg	35.8	0.12	0.02	ND	
WA:Olympia	20.0	0.01	0.00	ND	
WI:Madison	95.4	0.07	0.03	ND	

Note: σ = Counting Error. ND = Not Detectable.

Table 7

Gross Beta and Specific Gamma in Precipitation

September 1992

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L	$\pm 2\sigma$
AK:Anchorage	13.1	0.01	0.00	^{40}K: 42.0	28.2
AL:Montgomery	37.0	0.02	0.01	ND	
AR:Little Rock	305.0	0.66	0.12	^{7}Be: 61.2	40.0
CT:Hartford	58.0	0.09	0.02	ND	
DE:Wilmington	48.0	0.09	0.02	ND	
FL:Jacksonville	244.0	0.43	0.09	ND	
FL:Miami	80.4	0.03	0.02	ND	
FL:Miami	80.4	0.20	0.03	ND	
HI:Honolulu	7.0	0.01	0.00	ND	
ID:Idaho Falls	10.6	0.05	0.01	ND	
IL:Chicago	101.6	0.10	0.03	ND	
LA:New Orleans	160.4	0.12	0.04	ND	
ME:Augusta	53.0	0.11	0.02	^{7}Be: 35.5	33.4
MI:Lansing	83.8	0.12	0.03	^{7}Be: 45.5	43.5
MN:Minneapolis	72.0	0.06	0.02	ND	
MO:Jefferson City	109.0	0.18	0.04	^{40}K: 53.8	29.4
				^{7}Be: 43.2	41.7
NC:Charlotte	33.0	0.03	0.01	ND	
NC:Wilmington	24.0	0.14	0.01	ND	
NC:Wilmington	24.0	0.02	0.01	ND	
ND:Bismarck	27.6	0.11	0.01	^{212}Pb: 5.1	4.7
				^{40}K: 41.7	40.6
NH:Concord	47.4	0.09	0.02	ND	
NJ:Trenton	63.8	0.16	0.02	ND	
NM:Santa Fe	35.0	0.04	0.01	ND	
NY:Albany	69.8	0.14	0.03	ND	
NY:Niagara Falls	115.0	0.13	0.03	ND	
NY:Yaphank	101.0	0.24	0.04	^{40}K: 87.3	23.4
OH:Painesville	93.0	0.21	0.03	ND	
OH:Toledo	89.0	0.18	0.03	ND	
OR:Portland	29.4	0.04	0.01	ND	
PA:Harrisburg	134.4	0.10	0.04	ND	
SC:Barnwell	39.6	0.08	0.01	ND	
TN:Knoxville	70.0	0.09	0.02	ND	
TN:Nashville	110.6	0.14	0.04	ND	
TX:Austin	70.0	0.08	0.02	ND	
TX:El Paso	8.0	0.01	0.00	^{40}K: 82.7	29.4
VA:Lynchburg	26.2	0.15	0.01	^{40}K: 99.8	26.4
WA:Olympia	64.0	0.07	0.02	ND	
WI:Madison	113.0	0.10	0.03	ND	

Note: σ = Counting Error. ND = Not Detectable.

Table 8

Tritium in Precipitation

July–September 1992

Location	July 1992 nCi/L	±2σ	August 1992 nCi/L	±2σ	September 1992 nCi/L	±2σ
AK:Anchorage	NS		0.2	0.2	0.3	0.2
AL:Montgomery	0.1	0.2	0.1	0.2	0.2	0.2
AR:Little Rock	0.1	0.2	0.1	0.2	0.3	0.2
AZ:Phoenix	0.1	0.2	0.2	0.2	NS	
CO:Denver	0.2	0.2	0.1	0.2	NS	
CT:Hartford	0.2	0.2	0.1	0.2	0.1	0.2
DE:Wilmington	0.2	0.2	0.2	0.2	0.1	0.2
FL:Jacksonville	0.1	0.2	0.2	0.2	0.1	0.2
FL:Miami	0.1	0.2	0.1	0.2	0.2	0.2
HI:Honolulu	0.1	0.2	0.2	0.2	0.3	0.2
ID:Idaho Falls	0.2	0.2	NS		0.2	0.2
IL:Chicago	0.2	0.2	0.2	0.2	0.2	0.2
LA:New Orleans	0.2	0.2	0.1	0.2	0.2	0.2
ME:Augusta	0.3	0.2	0.1	0.2	0.3	0.2
MI:Lansing	0.2	0.2	0.2	0.2	0.1	0.2
MN:Minneapolis	0.1	0.2	0.2	0.2	0.2	0.2
MO:Jefferson City	0.1	0.2	0.1	0.2	0.2	0.2
MS:Jackson	0.1	0.2	0.1	0.2	NS	
NC:Charlotte	0.2	0.2	0.2	0.2	0.2	0.2
NC:Wilmington	0.2	0.2	0.2	0.2	0.2	0.2
ND:Bismarck	0.2	0.2	0.2	0.2	0.1	0.2
NH:Concord	0.2	0.2	0.1	0.2	0.1	0.2
NJ:Trenton	0.2	0.2	0.1	0.2	0.1	0.2
NM:Santa Fe	0.1	0.2	0.1	0.2	0.2	0.2
NY:Albany	0.3	0.2	0.1	2.0	0.1	0.2
NY:Niagara Falls	0.3	0.2	0.2	0.2	0.1	0.2
NY:Syracuse	0.2	0.2	0.2	0.2	NS	
NY:Yaphank	0.1	0.2	0.1	0.2	0.2	0.2
OH:Painesville	0.3	0.2	0.2	0.2	0.3	0.2
OH:Toledo	0.3	0.2	0.3	0.3	0.2	0.2
OR:Portland	0.1	0.2	0.2	0.2	0.1	0.2
PA:Harrisburg	0.1	0.2	0.1	0.2	0.2	0.2
SC:Barnwell	0.6	0.2	0.2	0.2	1.2	0.2
SC:Columbia	0.3	0.2	0.3	0.2	NS	
TN:Knoxville	0.2	0.2	0.1	0.2	0.1	0.2
TN:Nashville	0.2	0.2	0.2	0.2	0.2	0.2
TX:Austin	0.1	0.2	0.1	0.2	0.1	0.2
TX:El Paso	NS		0.1	0.2	0.2	0.2
UT:Salt Lake City	0.1	0.2	NS		NS	
VA:Lynchburg	0.1	0.2	0.2	0.2	0.2	0.2

Table 8 (continued)

Tritium in Precipitation

July–September 1992

Location	July 1992 nCi/L	±2σ	August 1992 nCi/L	±2σ	September 1992 nCi/L	±2σ
WA:Olympia	0.2	0.2	0.1	0.2	0.2	0.2
WI:Madison	0.3	0.2	0.2	0.2	0.1	0.2

Note: σ = Counting Error. NS = No Sample.

Plutonium and Uranium in Airborne Particulates and Precipitation

Environmental radiation levels of plutonium and uranium are determined by the analysis of semiannually composited samples (air filters) collected from the continuously operating airborne particulate samplers.

Concentrations of the specific isotopes of plutonium-238, -239, and -240 and uranium-234, -235, and -238 are determined by alpha spectroscopy following chemical separation. The volume of air represented by the semiannual composite ranges from 60,000 to 250,000 cubic meters.

Plutonium and uranium results are published when they become available.

Krypton-85

Krypton-85 is a long-lived noble gas with a half-life of 10.8 years. It is released into the atmosphere by nuclear reactor operations, fuel reprocessing, weapons tests, and research and defense related activities. Krypton-85 also occurs naturally in minor quantities primarily from the neutron capture of stable krypton-84 as well as spontaneous fission and neutron-induced fission of uranium. Krypton-85 in the atmosphere has been monitored to identify and establish baseline levels and long-term trends.

Krypton-85 analysis began in January 1973 with sample collections and analyses being performed for 12 sampling locations. These locations were selected to provide atmospheric coverage of the United States with considerations being given to the proximity to fuel reprocessing plants, nuclear reactors, and wide geographic coverage.

Dry compressed air samples, collected at each location, are purchased from commercial air suppliers and shipped to the NAREL, where the krypton-85 is cryogenically separated and counted in a liquid scintillation system.

The last Kr-85 results were for 1976, 1977, and 1979. They were published in *Environmental Radiation Data: Report 30.*

2. Water Program

The ERAMS water program provides data on ambient radiation levels in the nation's rivers, streams, and drinking water supplies.

Surface Water

Quarterly grab samples are taken downstream from operating or future nuclear facilities at 58 stations. Surface water samples are analyzed for tritium quarterly and specific gamma activity annually. Tritium is a primary radioactive pollutant from nuclear power plants and weapons production activities. Tritium concentrations are determined by liquid scintillation counting of distilled samples. Gamma scans are performed annually to determine levels of gamma emitting radionuclides.

Table 9 contains the tritium concentration data for July–September 1992.

Table 9

Tritium in Surface Water

July–September 1992

Location	Source	Date Collected	^3H nCi/L	$\pm 2\sigma$
AL:Decatur	Tennessee River	07/07/92	0.2	0.2
AL:Gordon	Chattahoochee River	07/08/92	0.2	0.2
AL:Scottsboro	Tennessee River	07/07/92	0.2	0.2
AR:Little Rock	Arkansas River	07/02/92	0.1	0.2
CA:Clay Station	Folsom S. Canal	07/17/92	0.1	0.2
CA:Diablo Canyon	Pacific Ocean	08/25/92	0.2	0.2
CA:Eureka	Humboldt Bay	07/09/92	0.1	0.2
CA:San Onofre	Pacific Ocean	09/28/92	0.1	0.2
CO:Platteville	South Platte River	07/01/92	0.2	0.2
FL:Crystal River	Gulf Of Mexico	07/06/92	0.1	0.2
FL:Ft. Pierce	Atlantic Ocean	07/06/92	0.1	0.2
FL:Homestead	Biscayne Bay	07/09/92	0.1	0.2
GA:Baxley	Altamaha River	07/08/92	0.1	0.2
IA:Cedar Rapids	Cedar River	07/16/92	0.3	0.2
ID:Buhl	Snake River	08/20/92	0.3	0.2
IL:E. Moline	Mississippi River	08/25/92	0.3	0.2
IL:Morris	Illinois River	07/09/92	0.3	0.2
IL:Zion	Lake Michigan	07/15/92	0.1	0.2
KS:Leroy	Neosho River	07/01/92	0.2	0.2
LA:New Orleans	Mississippi River	07/13/92	0.1	0.2
MD:Conowingo	Susquehanna River	07/06/92	0.1	0.2
ME:Wiscasset	Montseway Bay	07/08/92	0.3	0.2
MI:Bridgman	Lake Michigan	07/07/92	0.2	0.2
MI:South Haven	Lake Michigan	07/13/92	0.2	0.2
MN:Monticello	Mississippi River	08/12/92	0.2	0.2
MN:Red Wing	Mississippi River	07/17/92	0.2	0.2
MS:Port Gibson	Mississippi River	07/07/92	0.2	0.2
NC:Southport	Atlantic Ocean	07/02/92	0.1	0.2
NE:Rulo	Missouri River	07/20/92	0.2	0.2
NJ:Bayside	Delaware River	07/14/92	0.2	0.2
NJ:Oyster Creek	Oyster Creek	07/16/92	0.2	0.2
NV:Boulder City	Colorado River	07/01/92	0.1	0.2
NY:Chelsea	Hudson River	07/06/92	0.1	0.2
NY:Ossining	Hudson River	07/16/92	0.2	0.2
NY:Oswego	Lake Ontario	09/29/92	0.3	0.2
OH:Toledo	Lake Erie	07/02/92	0.2	0.2
OR:Bradwood	Columbia River	07/17/92	0.2	0.2

Table 9 (continued)

Tritium in Surface Water

July–September 1992

Location	Source	Date Collected	^3H nCi/L	$\pm 2\sigma$
PA:Danville	Susquehanna River	07/01/92	0.2	0.2
PA:Philadelphia	Schuylkill River-Queen	07/21/92	0.2	0.2
SC:Allendale	Savannah River	07/31/92	1.8	0.2
SC:Broad River	Broad River	07/24/92	0.4	0.2
SC:Hartsville	Lake Robinson	07/06/92	0.8	0.2
TN:Daisy	Tennessee River	07/21/92	0.2	0.2
TN:Kingston	Clinch River	09/22/92	0.3	0.2
TX:Matagorda	Colorado River	07/02/92	0.2	0.2
VA:Doswell	North Anna River	07/10/92	3.8	0.2
VA:Newport News	James River	07/22/92	0.1	0.2
VT:Vernon	Connecticut River	07/31/92	0.2	0.2
WA:Northport	Columbia River	09/22/92	0.1	0.2
WA:Richland	Columbia River	07/06/92	0.4	0.2
WI:Two Creeks	Lake Michigan	07/01/92	0.2	0.2
WI:Victory	Mississippi River	07/14/92	0.2	0.2
WV:Wheeling	Ohio River	07/07/92	0.2	0.2

Note: σ = Counting Error.

Drinking Water

This program monitors ambient radiation levels in drinking water at 78 sites. These data serve 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.

Grab samples are taken at the 78 sites which are either major population centers or selected nuclear facility environs.

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) specific iodine-131 on one quarterly sample per year for each station; and (e) an annual composite for plutonium-238, -239, and -240 and uranium-234, -235, and -238 for stations that demonstrate gross alpha levels greater than 2 pCi/L.

Tritium analyses are performed by scintillation counting of the distilled samples. Gross beta and alpha are determined by evaporating an aliquot on a stainless steel planchet for counting. Radium-226 is determined by the standard emanation technique. Strontium-90 is determined by beta counting a strontium carbonate precipitate isolated by ion exchange.

Table 10 contains the data from drinking water samples for July–September 1992.

Table 10

Tritium in Drinking Water

July–September 1992

Location	Date Collected	^3H nCi/L	$\pm 2\sigma$
AK:Fairbanks	07/09/92	0.2	0.2
AL:Montgomery	08/11/92	0.1	0.2
CA:Berkeley	07/15/92	0.1	0.2
CA:Los Angeles	07/01/92	0.1	0.2
CO:Platteville	07/01/92	0.2	0.2
CZ:Ancon	07/28/92	0.2	0.2
DC:Washington	07/15/92	0.2	0.2
DE:Dover	07/01/92	0.2	0.2
FL:Miami	07/02/92	0.2	0.2
FL:Tampa	08/31/92	0.2	0.2
GA:Baxley	07/08/92	0.1	0.2
GA:Savannah	09/04/92	0.2	0.2
HI:Honolulu	07/09/92	0.1	0.2
IA:Cedar Rapids	07/16/92	0.1	0.2
ID:Idaho Falls	07/15/92	0.2	0.2
MD:Baltimore	07/02/92	0.2	0.2
ME:Augusta	07/20/92	0.2	0.2
MI:Grand Rapids	07/01/92	0.2	0.2
MN:Minneapolis	07/16/92	0.2	0.2
MN:Red Wing	07/17/92	0.1	0.2
MS:Jackson	07/07/92	0.2	0.2
MS:Port Gibson	07/07/92	0.1	0.2
MT:Helena	07/02/92	0.2	0.2
NC:Wilmington	07/10/92	0.3	0.2
ND:Bismarck	07/06/92	0.2	0.2
NE:Lincoln	07/07/92	0.1	0.2
NJ:Trenton	07/06/92	0.1	0.2
NJ:Waretown	07/16/92	0.1	0.2
NY:Albany	07/07/92	0.2	0.2
NY:New York City	07/06/92	0.1	0.2
NY:Niagara Falls	07/01/92	0.3	0.2
OH:Columbus	07/21/92	0.1	0.2
OH:East Liverpool	08/21/92	0.2	0.2
OH:Painesville	07/06/92	0.2	0.2
OH:Toledo	07/02/92	0.2	0.2
OK:Oklahoma City	07/09/92	0.1	0.2
OR:Portland	07/20/92	0.2	0.2
PA:Columbia	07/07/92	0.2	0.2
PA:Harrisburg	07/16/92	0.1	0.2
PA:Philadelphia	07/21/92	0.1	0.2
PA:Philadelphia-Baxter	07/21/92	0.2	0.2

Table 10 (continued)

Tritium in Drinking Water

July–September 1992

Location	Date Collected	^3H nCi/L	$\pm 2\sigma$
PA:Philadelphia-Queen	07/21/92	0.1	0.2
PA:Pittsburgh	08/21/92	0.2	0.2
RI:Providence	07/20/92	0.2	0.2
SC:Barnwell	07/01/92	0.2	0.2
SC:Columbia	07/02/92	0.3	0.2
SC:Hartsville	07/01/92	0.1	0.2
SC:Jenkinsville	07/24/92	0.2	0.2
SC:Seneca	07/28/92	0.2	0.2
TN:Chattanooga	07/24/92	0.2	0.2
TN:Knoxville	07/01/92	0.2	0.2
TX:Austin	07/06/92	0.1	0.2
WA:Richland	07/07/92	0.4	0.2
WI:Genoa City	07/13/92	0.2	0.2
WI:Madison	07/15/92	0.1	0.2

Note: σ = Counting Error.

3. External Gamma Ambient Monitoring Program

The External Gamma Monitoring Program (EGAMP), which began in October 1978, provides a continuous measurement of ambient gamma exposure rates, including cosmic, at selected sites throughout the continental United States. Data from this program are used to evaluate fluctuations in natural background due to variations in environmental conditions and to provide a means of monitoring any significant increases in ambient gamma levels. The program consists of approximately 22 sites representing wide geographic coverage throughout the country.† Although exposure measurements at these few sites are not totally representative of nationwide exposures, they do indicate national trends.

The EGAMP program utilizes CaF_2:Mn thermoluminescent dosimeters (TLD's). These dosimeters are commercially available glass-bulb type dosimeters with energy compensating shields. A group of three TLD's is located at each station or site. Dosimeters are annealed by the station operator prior to positioning in the field. The dosimeters are returned to NAREL for readout approximately every three months. Several dosimeters are annealed by the station operator as controls and returned with the exposed field dosimeters to correct for any exposures accumulated during shipment.

Publication of EGAMP data has been suspended until problems with the data are resolved.

† Since some of these sites may not return dosimeters each period, the number of sites listed may vary slightly.

4. Milk Program

Pasteurized Milk

This is a cooperative program with the Dairy and Lipid Products Branch, Milk Sanitation Section, Food and Drug Administration. Milk is a reliable indicator of the general population's intake of radionuclides since it is consumed fresh by a large segment of the population and can contain several of the biologically important 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.

Monthly samples are collected at 65 sampling sites with at least one located in each state, Puerto Rico, and the Panama Canal Zone. 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. All samples collected in July are analyzed for strontium-90. Also, for the first month of the three quarters beginning January, April, and October, 10 regional composite samples of milk made up from the states within each of EPA's 10 regions are analyzed for strontium-90.

Iodine-131, barium-140, cesium-137, and potassium are determined by gamma spectral analysis. Strontium-90 is determined by beta counting a total strontium precipitate that has been chemically separated by ion exchange.

Tables 11–13 contain the concentrations of radionuclides in pasteurized milk for July–September 1992. Table 14 contains the concentrations of strontium-90 in pasteurized milk for July 1992.

Table 11

Radionuclides in Pasteurized Milk

July 1992

Location	Date Collected	K g/L	K ±2σ	^{137}Cs pCi/L	^{137}Cs ±2σ	^{140}Ba pCi/L	^{140}Ba ±2σ	^{131}I pCi/L	^{131}I ±2σ
AL:Montgomery	07/10/92	1.57	0.08	ND		ND		ND	
AR:Little Rock	07/06/92	1.55	0.14	ND		ND		ND	
AZ:Phoenix	07/09/92	1.60	0.06	ND		ND		ND	
CA:Los Angeles	07/06/92	1.60	0.08	ND		ND		ND	
CA:Sacramento	07/08/92	1.63	0.06	ND		ND		ND	
CT:Hartford	07/06/92	1.51	0.08	ND		ND		ND	
DE:Dover	07/15/92	1.63	0.08	ND		ND		ND	
GA:Atlanta	07/10/92	1.49	0.08	ND		ND		ND	
HI:Honolulu	07/27/92	1.61	0.08	ND		ND		ND	
IA:Des Moines	07/06/92	1.53	0.08	ND		ND		ND	
IN:Indianapolis	07/06/92	1.33	0.09	ND		ND		ND	
KY:Louisville	07/07/92	1.56	0.08	ND		ND		ND	
LA:New Orleans	07/27/92	1.45	0.10	ND		ND		ND	
MA:Boston	07/08/92	1.53	0.07	ND		ND		ND	
ME:Portland	07/06/92	1.61	0.07	ND		ND		ND	
MI:Detroit	07/08/92	1.49	0.10	ND		ND		ND	
MI:Grand Rapids	07/06/92	1.56	0.08	ND		ND		ND	
MN:St. Paul	07/01/92	1.58	0.08	ND		ND		ND	
MO:St. Louis	07/07/92	1.56	0.08	ND		ND		ND	
MS:Jackson	07/08/92	1.56	0.07	ND		ND		ND	
MT:Helena	07/23/92	1.51	0.08	ND		ND		ND	
NC:Charlotte	07/23/92	1.51	0.06	ND		ND		ND	
ND:Minot	07/28/92	1.47	0.08	ND		ND		ND	
NJ:Trenton	07/09/92	1.55	0.07	ND		ND		ND	
NM:Albuquerque	07/08/92	1.68	0.08	ND		ND		ND	
NV:Las Vegas	07/28/92	1.57	0.07	ND		ND		ND	
NY:Buffalo	07/13/92	1.59	0.05	ND		ND		ND	
NY:New York City	07/06/92	1.49	0.13	ND		ND		ND	
NY:Syracuse	07/07/92	1.61	0.08	ND		ND		ND	
OH:Cincinnati	07/31/92	1.56	0.06	ND		ND		ND	
OH:Cleveland	07/22/92	1.64	0.08	ND		ND		ND	
OK:Oklahoma City	07/02/92	1.56	0.08	ND		ND		ND	
OR:Portland	07/13/92	1.48	0.10	ND		ND		ND	
PA:Philadelphia	07/08/92	1.54	0.09	ND		ND		ND	
PA:Pittsburgh	07/06/92	1.47	0.08	ND		ND		ND	
PC:Cristobal	07/25/92	1.57	0.06	6	1	ND		ND	
PR:San Juan	07/08/92	1.56	0.08	ND		ND		ND	

Table 11 (continued)

Radionuclides in Pasteurized Milk

July 1992

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
SC:Charleston	07/23/92	1.63	0.08	ND		ND		ND	
SD:Rapid City	07/06/92	1.56	0.08	ND		ND		ND	
TN:Chattanooga	07/06/92	1.48	0.12	ND		ND		ND	
TN:Knoxville	07/06/92	1.54	0.08	ND		ND		ND	
TN:Memphis	07/08/92	1.60	0.08	ND		ND		ND	
TX:Austin	07/22/92	1.58	0.08	ND		ND		ND	
TX:Dallas	07/07/92	1.60	0.07	ND		ND		ND	
VA:Norfolk	07/31/92	1.60	0.05	ND		ND		ND	
VT:Montpelier	07/14/92	1.56	0.08	ND		ND		ND	
WA:Seattle	07/02/92	1.72	0.07	ND		ND		ND	
WA:Spokane	07/07/92	1.53	0.08	ND		ND		ND	
WV:Charleston	07/15/92	1.50	0.06	ND		ND		ND	

Note: σ = Counting Error. ND = Not Detectable.

Table 12

Radionuclides in Pasteurized Milk

August 1992

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
AL:Montgomery	08/07/92	1.63	0.10	ND		ND		ND	
AR:Little Rock	08/10/92	1.56	0.09	ND		ND		ND	
AZ:Phoenix	08/12/92	1.57	0.08	ND		ND		ND	
CA:Los Angeles	08/05/92	1.61	0.09	ND		ND		ND	
CA:San Francisco	08/13/92	1.57	0.10	ND		ND		ND	
DE:Dover	08/26/92	1.49	0.08	ND		ND		ND	
GA:Atlanta	08/04/92	1.47	0.08	ND		ND		ND	
HI:Honolulu	08/24/92	1.32	0.12	ND		ND		ND	
IA:Des Moines	08/04/92	1.57	0.08	ND		ND		ND	
IL:Chicago	08/06/92	1.55	0.08	ND		ND		ND	
IN:Indianapolis	08/03/92	1.57	0.08	ND		ND		ND	
KS:Wichita	08/24/92	1.55	0.14	ND		ND		ND	
KY:Louisville	08/04/92	1.51	0.14	ND		ND		ND	
MA:Boston	08/04/92	1.59	0.06	ND		ND		ND	
MD:Baltimore	08/07/92	1.56	0.20	ND		ND		ND	
MI:Detroit	08/06/92	1.57	0.08	ND		ND		ND	
MI:Grand Rapids	08/10/92	1.49	0.08	ND		ND		ND	
MN:St.Paul	08/04/92	1.67	0.07	ND		ND		ND	
MO:Kansas City	08/26/92	1.56	0.06	ND		ND		ND	
MO:St. Louis	08/04/92	1.47	0.08	ND		ND		ND	
MS:Jackson	08/05/92	1.54	0.08	ND		ND		ND	
MT:Helena	08/17/92	1.60	0.08	ND		ND		ND	
ND:Minot	08/27/92	1.48	0.12	ND		ND		ND	
NE:Omaha	08/28/92	1.43	0.10	ND		ND		ND	
NJ:Trenton	08/05/92	1.45	0.11	ND		ND		ND	
NM:Albuquerque	08/10/92	1.53	0.07	ND		ND		ND	
NV:Las Vegas	08/18/92	1.61	0.08	ND		ND		ND	
NY:Buffalo	08/10/92	1.54	0.10	ND		ND		ND	
NY:Syracuse	08/03/92	1.62	0.10	ND		ND		ND	
OH:Cincinnati	08/28/92	1.58	0.06	ND		ND		ND	
OH:Cleveland	08/25/92	1.50	0.08	ND		ND		ND	
OK:Oklahoma City	08/03/92	1.57	0.08	ND		ND		ND	
OR:Portland	08/10/92	1.50	0.12	ND		ND		ND	
PA:Philadelphia	08/03/92	1.47	0.10	ND		ND		ND	
PA:Pittsburgh	08/03/92	1.58	0.13	ND		ND		ND	
PR:San Juan	08/13/92	1.47	0.14	ND		ND		ND	
SC:Charleston	08/26/92	1.45	0.08	ND		ND		ND	

Table 12 (continued)

Radionuclides in Pasteurized Milk

August 1992

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
SD:Rapid City	08/03/92	1.56	0.08	ND		ND		ND	
TN:Knoxville	08/05/92	1.66	0.08	ND		ND		ND	
TX:Austin	08/25/92	1.51	0.08	ND		ND		ND	
TX:Ft. Worth	08/28/92	1.44	0.08	ND		ND		ND	
VA:Norfolk	08/14/92	1.70	0.07	ND		ND		ND	
VT:Montpelier	08/04/92	1.50	0.08	ND		ND		ND	
WA:Seattle	08/04/92	1.59	0.06	ND		ND		ND	
WA:Spokane	08/04/92	1.61	0.06	ND		ND		ND	
WV:Charleston	08/10/92	1.64	0.08	ND		ND		ND	

Note: σ = Counting Error. ND = Not Detectable.

Table 13

Radionuclides in Pasteurized Milk

September 1992

Location	Date Collected	K g/L	K ±2σ	^{137}Cs pCi/L	^{137}Cs ±2σ	^{140}Ba pCi/L	^{140}Ba ±2σ	^{131}I pCi/L	^{131}I ±2σ
AL:Montgomery	09/15/92	1.58	0.07	ND		ND		ND	
AR:Little Rock	09/08/92	1.59	0.06	ND		ND		ND	
AZ:Phoenix	09/03/92	1.60	0.07	ND		ND		ND	
CA:Los Angeles	09/15/92	1.63	0.07	ND		ND		ND	
CA:Sacramento	09/01/92	1.56	0.06	ND		ND		ND	
CA:San Francisco	09/09/92	1.58	0.08	ND		ND		ND	
CO:Denver	09/15/92	1.47	0.10	ND		ND		ND	
DE:Dover	09/09/92	1.61	0.06	ND		ND		ND	
GA:Atlanta	09/01/92	1.58	0.08	ND		ND		ND	
IA:Des Moines	09/08/92	1.61	0.08	ND		ND		ND	
IL:Chicago	09/03/92	1.57	0.06	ND		ND		ND	
IN:Indianapolis	09/08/92	1.67	0.07	ND		ND		ND	
KS:Wichita	09/23/92	1.55	0.08	ND		ND		ND	
KY:Louisville	09/08/92	1.45	0.11	ND		ND		ND	
LA:New Orleans	09/02/92	1.46	0.06	ND		ND		ND	
MA:Boston	09/09/92	1.54	0.08	ND		ND		ND	
MD:Baltimore	09/04/92	1.70	0.08	ND		ND		ND	
MI:Detroit	09/03/92	1.53	0.08	ND		ND		ND	
MI:Grand Rapids	09/08/92	1.63	0.08	ND		ND		ND	
MS:Jackson	09/01/92	1.66	0.07	ND		ND		ND	
MT:Helena	09/22/92	1.62	0.12	ND		ND		ND	
NC:Charlotte	09/25/92	1.66	0.05	ND		ND		ND	
ND:Minot	09/28/92	1.66	0.07	ND		ND		ND	
NE:Omaha	09/28/92	1.53	0.08	ND		ND		ND	
NJ:Trenton	09/09/92	1.62	0.08	ND		ND		ND	
NM:Albuquerque	09/23/92	1.49	0.06	ND		ND		ND	
NV:Las Vegas	09/09/92	1.64	0.08	ND		ND		ND	
NY:Buffalo	09/21/92	1.37	0.12	ND		ND		ND	
NY:Syracuse	09/08/92	1.55	0.08	ND		ND		ND	
OH:Cincinnati	09/28/92	1.55	0.14	ND		ND		ND	
OH:Cleveland	09/30/92	1.61	0.07	ND		ND		ND	
OK:Oklahoma City	09/08/92	1.86	0.09	ND		ND		ND	
PA:Philadelphia	09/09/92	1.54	0.08	ND		ND		ND	
PA:Pittsburgh	09/08/92	1.52	0.07	ND		ND		ND	
PC:Cristobal	09/08/92	1.58	0.08	9	2	ND		ND	
PR:San Juan	09/09/92	1.61	0.08	ND		ND		ND	
SC:Charleston	09/28/92	1.52	0.05	ND		ND		ND	

Table 13 (continued)

Radionuclides in Pasteurized Milk

September 1992

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
SD:Rapid City	09/03/92	1.61	0.07	ND		ND		ND	
TN:Chattanooga	09/10/92	1.66	0.07	ND		ND		ND	
TN:Knoxville	09/14/92	1.56	0.07	ND		ND		ND	
TN:Memphis	09/10/92	1.63	0.05	ND		ND		ND	
TX:Austin	09/28/92	1.56	0.12	ND		ND		ND	
TX:Dallas	09/08/92	1.48	0.14	ND		ND		ND	
VT:Montpelier	09/23/92	1.64	0.07	ND		ND		ND	
WA:Seattle	09/02/92	1.54	0.10	ND		ND		ND	
WA:Spokane	09/10/92	1.44	0.14	ND		ND		ND	
WV:Charleston	09/15/92	1.60	0.06	ND		ND		ND	

Note: σ = Counting Error. ND = Not Detectable.

Table 14

Strontium-90 in Pasteurized Milk

July 1992

EPA Location	Collection Date	^{90}Sr pCi/L	$\pm 2\sigma$
AL:Montgomery	07/10/92	1.5	0.3
AR:Little Rock	07/06/92	3.3	0.7
AZ:Phoenix	07/09/92	0.4	0.5
CA:Los Angeles	07/06/92	ND	
CA:Sacramento	07/08/92	0.8	0.2
CT:Hartford	07/06/92	2.3	0.6
DE:Dover	07/15/92	1.7	0.0
GA:Atlanta	07/10/92	0.6	0.2
HI:Honolulu	07/27/92	1.1	0.2
IA:Des Moines	07/06/92	1.8	0.6
IN:Indianapolis	07/06/92	2.2	0.5
KY:Louisville	07/07/92	0.7	1.4
LA:New Orleans	07/27/92	3.5	0.1
MA:Boston	07/08/92	1.0	0.7
ME:Portland	07/06/92	1.4	0.2
MI:Detroit	07/08/92	1.7	0.2
MI:Grand Rapids	07/06/92	1.9	0.9
MN:St. Paul	07/01/92	ND	
MO:St. Louis	07/07/92	1.0	1.0
MS:Jackson	07/08/92	1.5	0.1
MT:Helena	07/23/92	1.7	0.8
NC:Charlotte	07/23/92	1.3	0.4
ND:Minot	07/28/92	1.7	0.2
NE:Omaha	07/30/92	1.4	0.3
NJ:Trenton	07/09/92	0.8	0.1
NM:Albuquerque	07/08/92	0.7	0.8
NV:Las Vegas	07/28/92	3.2	0.4
NY:Buffalo	07/13/92	1.8	0.5
NY:New York City	07/06/92	1.9	0.0
NY:Syracuse	07/07/92	1.3	0.5
OH:Cincinnati	07/31/92	1.5	0.4
OH:Cleveland	07/22/92	2.0	0.4
OK:Oklahoma City	07/02/92	2.3	0.7
OR:Portland	07/13/92	0.7	0.5
PA:Philadelphia	07/08/92	1.5	0.5
PA:Pittsburgh	07/06/92	1.4	0.8
PC:Cristobal	07/23/92	0.4	0.0

Table 14 (continued)

Strontium-90 in Pasteurized Milk

July 1992

EPA Location	Collection Date	^{90}Sr pCi/L	$\pm 2\sigma$
PR:San Juan	07/08/92	0.7	0.1
SC:Charleston	07/23/92	1.0	0.1
SD:Rapid City	07/06/92	1.6	0.3
TN:Chattanooga	07/06/92	1.2	0.8
TN:Knoxville	07/06/92	1.1	0.7
TN:Memphis	07/08/92	2.6	0.1
TX:Austin	07/22/92	0.6	0.4
TX:Dallas	07/07/92	0.8	0.3
VA:Norfolk	07/02/92	1.0	0.4
VT:Montpelier	07/14/92	1.7	0.5
WA:Seattle	07/02/92	0.0	1.7
WA:Spokane	07/07/92	1.3	0.1
WV:Charleston	07/15/92	1.8	1.3

Note: σ = Counting Error. NA = Not Analysed.

Carbon-14 in Milk

Nine stations, chosen for wide geographical distribution, contribute milk samples for annual analysis of carbon-14. These samples are monitored for carbon-14 levels in the food chain resulting from nuclear testing. The pasteurized milk is freeze-dried and the resulting powder is pelletized for ease of combustion. Analysis consists of combusting the samples and converting the released carbon dioxide through a series of chemical conversions to benzene, which is then assayed for carbon-14 by liquid scintillation.

The samples undergo three main steps in the chemical conversions to benzene prior to liquid scintillation counting. They include (1) combustion of the sample to carbon dioxide, (2) conversion of the carbon dioxide to acetylene, and (3) trimerizations of the acetylene to benzene. The last carbon-14 results were for samples collected during April–May 1982, 1983–1986, and March–May 1987. They were published in *Environmental Radiation Data: Report 54* and *Environmental Radiation Data: Report 59.*

Environmental Radiation Data (ERD) is published quarterly (January, April, July, October) by the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air.

Requests for information concerning publication and distribution of ERD should be directed to:

Charles M. Petko
Office of the Director
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601

Requests for information concerning the operation of ERAMS should be directed to:

John G. Griggs, Chief
Monitoring and Analytical Services Branch
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601

or to:

William C. Conklin
Policy and Emergency Response Branch
Criteria and Standards Division (6602J)
USEPA Waterside Mall
401 M Street, S.W.
Washington, DC 20460

***

EPA
United States
Environmental Protection Agency
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, AL 36115-2601

Official Business
Penalty for Private Use
$300