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## 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, 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).

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# 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  $2\sigma$  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  $2\sigma$  (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 routine minimum detectable concentrations (MDCs) for each isotope 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. Reporting increments are sometimes considerably smaller than MDCs 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 Concentrations for Radionuclide Analyses**

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Concentrations
Gross Alpha	Water	pCi/L	1 pCi/L	2 pCi/L
† Gross Beta	Air	pCi/m <sup>3</sup>	0.01 pCi/m <sup>3</sup>	0.0015 pCi/m <sup>3</sup>
	Water	pCi/L	1 pCi/L	2 pCi/L
	Precipitation	nCi/m <sup>2</sup>	0.01 nCi/m <sup>2</sup>	0.005 nCi/m <sup>2</sup>
	(specific radiochemical analyses)			
Tritium	Water	nCi/L	0.1 nCi/L	0.15 nCi/L
	Milk	nCi/L	0.1 nCi/L	0.15 nCi/L
†† Plutonium-238,239/240	Air	aCi/m <sup>3</sup>	0.1 aCi/m <sup>3</sup>	1.5 aCi/m <sup>3</sup>
	Water	pCi/L	0.001 pCi/L	0.1 pCi/L
‡ Uranium-234,235,238	Air	aCi/m <sup>3</sup>	0.1 aCi/m <sup>3</sup>	1.5 aCi/m <sup>3</sup>
	Water	pCi/L	0.001 pCi/L	0.1 pCi/L
Radium-226	Water	pCi/L	0.1 pCi/L	0.02 pCi/L
Strontium-90	Milk	pCi/L	0.1 pCi/L	2 pCi/L
	Water	pCi/L	0.1 pCi/L	1 pCi/L
‡‡ Iodine-131	Milk (gamma)	pCi/L	1 pCi/L	4 pCi/L
	Water (gamma)	pCi/L	1 pCi/L	4 pCi/L
	Water	pCi/L	0.1 pCi/L	0.3 pCi/L
Cesium-137	Milk	pCi/L	1 pCi/L	5 pCi/L
	Water	pCi/L	1 pCi/L	5 pCi/L
‡‡‡ Barium-140	Milk	pCi/L	1 pCi/L	15 pCi/L
	Water	pCi/L	1 pCi/L	15 pCi/L
Potassium	Milk	g/L	0.1 g/L	0.06 g/L
	Water	g/L	0.1 g/L	0.06 g/L
Potassium-40	Water	pCi/L	1 pCi/L	50 pCi/L

† The MDC for precipitation is based on the assumption of 1 cm of precipitation.

†† The MDC for air is based on an assumed total sample volume of 60,000 m<sup>3</sup>. Measurement by alpha spectroscopy includes contributions of plutonium-239 and plutonium-240.

‡ The MDC for air is based on an assumed total sample volume of 60,000 m<sup>3</sup>.

‡‡ 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 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<sup>3</sup>. 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 many 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 April–June 1992. Tables 5–7 contain the data from precipitation samples for April–June 1992. Table 8 contains the data from tritium in precipitation samples for April–June 1992 at the selected sites.

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† 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**  
 April 1992

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
AL:Montgomery	3	0.0	0.0	0.0	0.01	0.01	0.01
AR:Little Rock	6	0.5	0.1	0.3	0.02	0.01	0.01
AZ:Phoenix	4	1.0	0.4	0.8	0.02	0.00	0.01
CA:Berkeley	8	0.1	0.0	0.1	0.01	0.00	0.00
CA:Los Angeles	8	0.6	0.0	0.2	0.02	0.01	0.01
CO:Denver	8	1.0	0.1	0.5	0.01	0.00	0.01
CT:Hartford	9	0.2	0.0	0.0	0.01	0.00	0.01
DE:Wilmington	7	0.2	0.0	0.1	0.01	0.00	0.01
FL:Jacksonville	5	0.2	0.1	0.1	0.01	0.00	0.01
FL:Miami	9	0.2	0.0	0.1	0.01	0.00	0.01
HI:Honolulu	7	0.2	0.1	0.1	0.01	0.00	0.00
IA:Iowa City	8	0.3	0.0	0.2	0.06	0.01	0.02
ID:Boise	7	1.0	0.1	0.5	0.02	0.01	0.01
ID:Idaho Falls	8	0.0	0.0	0.0	0.01	0.00	0.01
IL:Chicago	8	0.5	0.1	0.3	0.02	0.01	0.01
IN:Indianapolis	7	1.0	0.0	0.3	0.02	0.01	0.01
KS:Topeka	7	2.1	0.1	0.8	0.02	0.01	0.01
KY:Frankfort	4	0.3	0.1	0.2	0.01	0.01	0.01
LA:New Orleans	7	0.2	0.0	0.1	0.01	0.00	0.01
MA:Lawrence	8	0.1	0.0	0.1	0.01	0.00	0.01
ME:Augusta	7	0.2	0.0	0.1	0.01	0.00	0.01
MI:Lansing	9	0.2	0.0	0.1	0.01	0.00	0.01
MN:Minneapolis	5	0.2	0.1	0.1	0.02	0.01	0.01
MO:Jefferson City	7	1.2	0.1	0.5	0.01	0.01	0.01
MS:Jackson	6	0.3	0.0	0.2	0.01	0.01	0.01
NC:Charlotte	7	0.2	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	6	0.0	0.0	0.0	0.01	0.00	0.01
ND:Bismarck	6	1.3	0.1	0.8	0.02	0.01	0.01
NE:Lincoln	3	0.6	0.2	0.4	0.02	0.01	0.01
NH:Concord	8	0.1	0.0	0.1	0.01	0.00	0.01
NJ:Trenton	8	0.8	0.1	0.3	0.01	0.00	0.01
NM:Santa Fe	8	0.4	0.1	0.3	0.01	0.01	0.01
NV:Las Vegas	9	0.3	0.1	0.2	0.01	0.01	0.01
NY:Albany	5	0.5	0.0	0.2	0.01	0.01	0.01
NY:Niagara Falls	8	0.3	0.0	0.1	0.02	0.00	0.01
NY:Syracuse	3	0.1	0.0	0.0	0.01	0.01	0.01
NY:Yaphank	10	0.2	0.0	0.1	0.01	0.00	0.00

**Table 2 (continued)**  
**Gross Beta in Airborne Particulates**  
 April 1992

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Columbus	4	0.1	0.0	0.1	0.01	0.01	0.01
OH:Painesville	6	0.3	0.0	0.1	0.01	0.00	0.01
OH:Ross	8	0.0	0.0	0.0	0.01	0.01	0.01
OH:Toledo	9	0.9	0.1	0.4	0.03	0.01	0.02
OK:Oklahoma City	4	0.7	0.3	0.5	0.02	0.01	0.02
OR:Portland	7	0.0	0.0	0.0	0.01	0.00	0.00
PA:Harrisburg	9	0.5	0.1	0.2	0.01	0.00	0.01
RI:Providence	7	0.0	0.0	0.0	0.01	0.00	0.01
SC:Barnwell	3	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	8	0.4	0.0	0.2	0.01	0.01	0.01
SD:Pierre	3	0.4	0.3	0.4	0.01	0.01	0.01
TN:Knoxville	8	0.9	0.2	0.5	0.02	0.01	0.01
TN:Nashville	8	0.4	0.0	0.3	0.01	0.01	0.01
TX:Austin	7	0.2	0.0	0.1	0.01	0.00	0.01
TX:El Paso	8	1.3	0.5	0.8	0.02	0.01	0.01
UT:Salt Lake City	9	0.5	0.0	0.3	0.02	0.01	0.01
VA:Lynchburg	9	0.6	0.2	0.3	0.01	0.00	0.01
VA:Virginia Beach	2	0.1	0.1	0.1	0.01	0.01	0.01
WA:Olympia	8	0.5	0.1	0.2	0.01	0.00	0.00
WA:Spokane	9	0.5	0.1	0.3	0.01	0.00	0.01
WI:Madison	9	0.5	0.1	0.3	0.01	0.00	0.01

Minimum Detectable Limit for field estimates – 0.1 pCi/m<sup>3</sup>.

Minimum Detectable Limit for laboratory measurement – 0.01 pCi/m<sup>3</sup>.

**Table 3**  
**Gross Beta in Airborne Particulates**  
 May 1992

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
AL:Montgomery	6	0.2	0.0	0.1	0.01	0.01	0.01
AR:Little Rock	8	0.5	0.1	0.3	0.01	0.01	0.01
AZ:Phoenix	4	0.4	0.1	0.3	0.02	0.01	0.01
CA:Berkeley	8	0.1	0.0	0.0	0.01	0.00	0.00
CA:Los Angeles	9	1.5	0.0	0.2	0.01	0.01	0.01
CO:Denver	8	1.3	0.2	0.6	0.01	0.01	0.01
CT:Hartford	8	0.1	0.0	0.1	0.01	0.00	0.01
DE:Wilmington	9	0.4	0.0	0.2	0.01	0.00	0.01
FL:Jacksonville	8	0.2	0.0	0.1	0.01	0.01	0.01
FL:Miami	8	0.1	0.0	0.0	0.02	0.01	0.01
HI:Honolulu	7	0.2	0.1	0.1	0.01	0.00	0.00
IA:Iowa City	8	0.5	0.1	0.3	0.01	0.01	0.01
ID:Boise	9	0.6	0.1	0.4	0.02	0.01	0.01
ID:Idaho Falls	9	0.0	0.0	0.0	0.01	0.00	0.01
IL:Chicago	9	0.8	0.1	0.3	0.02	0.01	0.01
IN:Indianapolis	8	0.7	0.2	0.5	0.02	0.01	0.01
KS:Topeka	6	4.5	1.0	1.7	0.02	0.01	0.01
KY:Frankfort	3	0.4	0.2	0.3	0.01	0.01	0.01
LA:New Orleans	8	0.2	0.1	0.1	0.02	0.01	0.01
MA:Lawrence	8	0.3	0.0	0.1	0.01	0.00	0.00
ME:Augusta	8	0.5	0.1	0.2	0.01	0.00	0.00
MI:Lansing	8	0.4	0.1	0.3	0.01	0.01	0.01
MN:Minneapolis	7	0.7	0.1	0.3	0.01	0.00	0.01
MO:Jefferson City	8	0.9	0.2	0.4	0.02	0.01	0.01
MS:Jackson	8	0.7	0.2	0.4	0.02	0.01	0.01
NC:Charlotte	9	0.2	0.1	0.1	0.02	0.00	0.01
NC:Wilmington	5	0.0	0.0	0.0	0.02	0.01	0.01
ND:Bismarck	8	1.6	0.3	0.9	0.02	0.01	0.01
NE:Lincoln	1	0.7	0.7	0.7	0.01	0.01	0.01
NH:Concord	9	0.5	0.0	0.2	0.01	0.00	0.00
NJ:Trenton	8	1.0	0.1	0.5	0.01	0.00	0.01
NM:Santa Fe	9	0.4	0.0	0.2	0.01	0.00	0.01
NV:Las Vegas	8	0.3	0.1	0.2	0.01	0.00	0.01
NY:Albany	4	0.1	0.0	0.1	0.01	0.01	0.01
NY:Niagara Falls	9	0.5	0.0	0.2	0.01	0.01	0.01
NY:Syracuse	3	0.1	0.0	0.1	0.01	0.01	0.01
NY:Yaphank	7	0.5	0.0	0.2	0.01	0.00	0.01

**Table 3 (continued)**  
**Gross Beta in Airborne Particulates**  
**May 1992**

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Columbus	3	0.1	0.0	0.0	0.01	0.01	0.01
OH:Painesville	8	0.2	0.1	0.2	0.01	0.01	0.01
OH:Ross	9	0.0	0.0	0.0	0.01	0.01	0.01
OH:Toledo	8	1.1	0.1	0.6	0.02	0.01	0.01
OK:Oklahoma City	6	0.3	0.0	0.2	0.01	0.01	0.01
OR:Portland	9	0.0	0.0	0.0	0.01	0.00	0.01
PA:Harrisburg	8	0.7	0.1	0.3	0.01	0.00	0.01
RI:Providence	8	0.0	0.0	0.0	0.01	0.00	0.01
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.00	0.00
SC:Columbia	9	0.5	0.1	0.2	0.03	0.00	0.01
SD:Pierre	1	0.4	0.4	0.4	0.01	0.01	0.01
TN:Knoxville	9	0.7	0.1	0.5	0.02	0.01	0.01
TN:Nashville	8	0.8	0.2	0.4	0.04	0.01	0.01
TX:Austin	8	0.2	0.0	0.1	0.01	0.00	0.01
TX:El Paso	8	0.7	0.1	0.4	0.01	0.01	0.01
UT:Salt Lake City	5	0.2	0.0	0.1	0.01	0.01	0.01
VA:Lynchburg	8	0.9	0.2	0.4	0.01	0.00	0.01
VA:Virginia Beach	2	0.1	0.1	0.1	0.01	0.00	0.00
WA:Olympia	9	0.5	0.0	0.1	0.01	0.00	0.01
WA:Spokane	8	0.6	0.2	0.4	0.02	0.00	0.01
WI:Madison	8	0.9	0.2	0.5	0.02	0.01	0.01

Minimum Detectable Limit for field estimates – 0.1 pCi/m<sup>3</sup>.

Minimum Detectable Limit for laboratory measurement – 0.01 pCi/m<sup>3</sup>.

**Table 4**  
**Gross Beta in Airborne Particulates**  
 June 1992

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
AL:Montgomery	6	0.4	0.0	0.1	0.03	0.01	0.01
AR:Little Rock	7	0.3	0.1	0.2	0.01	0.01	0.01
AZ:Phoenix	5	0.4	0.0	0.3	0.02	0.01	0.01
CA:Berkeley	9	0.0	0.0	0.0	0.01	0.00	0.00
CA:Los Angeles	9	0.2	0.0	0.1	0.01	0.00	0.01
CO:Denver	7	0.5	0.1	0.3	0.01	0.01	0.01
CT:Hartford	9	0.1	0.0	0.1	0.01	0.00	0.01
DE:Wilmington	9	0.5	0.1	0.2	0.01	0.00	0.01
FL:Jacksonville	7	0.1	0.0	0.0	0.01	0.00	0.01
FL:Miami	9	0.1	0.0	0.0	0.01	0.00	0.00
HI:Honolulu	5	0.2	0.1	0.2	0.00	0.00	0.00
IA:Iowa City	9	0.9	0.1	0.3	0.02	0.01	0.01
ID:Boise	9	0.5	0.1	0.2	0.01	0.00	0.01
ID:Idaho Falls	7	0.0	0.0	0.0	0.01	0.00	0.01
IL:Chicago	8	0.6	0.1	0.3	0.01	0.00	0.01
IN:Indianapolis	9	0.6	0.2	0.4	0.01	0.00	0.01
KS:Topeka	8	1.1	0.2	0.6	0.01	0.01	0.01
KY:Frankfort	4	0.2	0.1	0.2	0.08	0.00	0.02
LA:New Orleans	9	0.2	0.1	0.1	0.01	0.01	0.01
MA:Lawrence	7	0.2	0.0	0.1	0.01	0.00	0.01
ME:Augusta	8	0.2	0.0	0.1	0.01	0.00	0.01
MI:Lansing	9	0.4	0.2	0.3	0.01	0.00	0.01
MN:Minneapolis	4	0.3	0.1	0.2	0.02	0.01	0.01
MO:Jefferson City	9	0.9	0.4	0.6	0.01	0.01	0.01
MS:Jackson	8	0.4	0.1	0.2	0.02	0.01	0.01
NC:Charlotte	9	0.1	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	6	0.0	0.0	0.0	0.01	0.00	0.01
ND:Bismarck	9	1.4	0.3	0.8	0.01	0.00	0.01
NE:Lincoln	7	0.8	0.3	0.5	0.02	0.01	0.01
NH:Concord	8	0.2	0.1	0.1	0.01	0.00	0.01
NJ:Trenton	9	1.0	0.2	0.4	0.01	0.00	0.01
NM:Santa Fe	7	0.4	0.2	0.3	0.01	0.01	0.01
NV:Las Vegas	9	0.3	0.1	0.2	0.02	0.01	0.01
NY:Albany	4	0.1	0.0	0.0	0.01	0.00	0.01
NY:Niagara Falls	8	0.3	0.1	0.2	0.02	0.00	0.01
NY:Yaphank	9	0.2	0.1	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**  
**June 1992**

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Painesville	6	0.4	0.0	0.2	0.02	0.00	0.01
OH:Ross	10	0.0	0.0	0.0	0.02	0.01	0.01
OH:Toledo	7	1.0	0.3	0.6	0.02	0.01	0.01
OK:Oklahoma City	2	0.1	0.0	0.1	0.01	0.01	0.01
OR:Portland	9	0.0	0.0	0.0	0.01	0.00	0.00
PA:Harrisburg	9	0.4	0.0	0.2	0.01	0.00	0.01
RI:Providence	9	0.0	0.0	0.0	0.01	0.00	0.01
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	9	0.3	0.1	0.1	0.01	0.00	0.01
SD:Pierre	8	0.8	0.2	0.4	0.01	0.01	0.01
TN:Knoxville	9	0.8	0.1	0.4	0.02	0.01	0.01
TN:Nashville	9	0.4	0.1	0.2	0.01	0.01	0.01
TX:Austin	8	0.2	0.0	0.1	0.01	0.00	0.01
TX:El Paso	9	1.1	0.1	0.5	0.02	0.01	0.01
UT:Salt Lake City	8	0.3	0.0	0.1	0.01	0.00	0.01
VA:Lynchburg	9	0.9	0.3	0.6	0.01	0.00	0.01
VA:Virginia Beach	4	0.1	0.0	0.1	0.01	0.01	0.01
WA:Olympia	9	0.1	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	0.8	0.2	0.4	0.02	0.00	0.01

Minimum Detectable Limit for field estimates – 0.1 pCi/m<sup>3</sup>.

Minimum Detectable Limit for laboratory measurement – 0.01 pCi/m<sup>3</sup>.

**Table 5**  
**Gross Beta and Specific Gamma in Precipitation**  
**April 1992**

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m <sup>2</sup>	±2σ	Activity pCi/L ±2σ
AL:Montgomery	89.0	0.15	0.04	<sup>212</sup> Pb: 6.4±5.5 <sup>7</sup> Be: 53.7±47.3
AR:Little Rock	50.0	0.08	0.02	ND
AZ:Phoenix	11.0	0.01	0.00	ND
CO:Denver	10.4	0.03	0.00	<sup>7</sup> Be: 41.5±38.7
CT:Hartford	28.0	0.01	0.01	ND
DE:Wilmington	2.4	0.00	0.00	ND
FL:Jacksonville	51.6	0.07	0.02	<sup>212</sup> Pb: 5.2±5.1
FL:Miami	40.2	0.08	0.02	ND
HI:Honolulu	36.0	0.03	0.01	ND
ID:Boise	20.0	0.05	0.01	ND
IL:Chicago	39.6	0.04	0.01	<sup>7</sup> Be: 42.6±37.0
LA:New Orleans	132.8	0.11	0.04	ND
MI:Lansing	122.8	0.09	0.04	<sup>7</sup> Be: 60.4±38.6
MN:Minneapolis	50.0	0.03	0.01	ND
MO:Jefferson City	24.0	0.02	0.01	ND
MS:Jackson	42.0	0.04	0.02	ND
NC:Charlotte	72.0	0.07	0.03	ND
NC:Wilmington	61.0	0.10	0.03	<sup>7</sup> Be: 37.3±28.6
ND:Bismarck	6.0	0.01	0.00	<sup>7</sup> Be: 75.5±48.8
NH:Concord	9.6	0.04	0.01	<sup>7</sup> Be: 63.2±27.2
NJ:Trenton	25.2	0.13	0.01	<sup>7</sup> Be: 138±29
NV:Las Vegas	36.0	0.08	0.02	ND
NY:Albany	73.0	0.20	0.04	<sup>7</sup> Be: 72.7±26.4
NY:Niagara Falls	108.0	0.30	0.05	<sup>7</sup> Be: 51.2±26.2
NY:Yaphank	43.0	0.27	0.03	<sup>7</sup> Be: 149±45
OH:Painesville	65.2	0.15	0.02	<sup>7</sup> Be: 51.9±45.2
OH:Toledo	96.0	0.06	0.03	ND
OK:Oklahoma City	12.0	0.02	0.00	ND
OR:Portland	64.6	0.07	0.02	<sup>7</sup> Be: 63.2±38.0
PA:Harrisburg	46.4	0.06	0.02	<sup>7</sup> Be: 38.5±29.6
SC:Barnwell	29.6	0.04	0.01	ND
SC:Columbia	38.4	0.10	0.02	ND
TN:Knoxville	56.0	0.07	0.02	ND
TN:Nashville	12.2	0.06	0.01	ND
TX:Austin	50.0	0.02	0.01	ND
TX:El Paso	11.0	0.04	0.01	ND
UT:Salt Lake City	20.0	0.02	0.01	ND
VA:Lynchburg	52.4	0.12	0.02	ND
WA:Olympia	121.6	0.07	0.04	ND
WI:Madison	7.4	0.01	0.00	<sup>7</sup> Be: 31.3±29.2

**Table 6**  
**Gross Beta and Specific Gamma in Precipitation**  
**May 1992**

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m <sup>2</sup>	±2σ	Activity pCi/L ±2σ
AL:Montgomery	23.0	0.03	0.01	ND
AR:Little Rock	62.6	0.18	0.03	ND
AZ:Phoenix	18.0	0.02	0.01	ND
CO:Denver	14.4	0.10	0.01	ND
CT:Hartford	12.0	0.01	0.00	ND
DE:Wilmington	140.0	0.61	0.07	<sup>7</sup> Be: 37.2±28.9
FL:Jacksonville	65.0	0.07	0.02	ND
FL:Miami	10.8	0.02	0.00	ND
HI:Honolulu	34.0	0.04	0.01	ND
ID:Idaho Falls	5.6	0.03	0.00	ND
IL:Chicago	2.8	0.01	0.00	ND
LA:New Orleans	4.8	0.01	0.00	ND
MI:Lansing	39.8	0.13	0.02	ND
MN:Minneapolis	26.0	0.05	0.01	ND
MO:Jefferson City	65.0	0.15	0.03	<sup>7</sup> Be: 54.8±35.7
MS:Jackson	42.0	0.03	0.01	ND
NC:Charlotte	66.0	0.25	0.03	<sup>7</sup> Be: 90.5±33.8
NC:Wilmington	13.0	0.03	0.01	<sup>7</sup> Be: 55.1±30.6 <sup>212</sup> Pb: 4.7±4.7
ND:Bismarck	26.8	0.06	0.01	ND
NH:Concord	43.6	0.08	0.02	<sup>7</sup> Be: 90.9±41.2
NJ:Trenton	43.2	0.10	0.02	<sup>7</sup> Be: 39.0±37.0
NM:Santa Fe	47.0	0.03	0.01	ND
NY:Albany	39.0	0.08	0.02	<sup>7</sup> Be: 46.4±26.7
NY:Niagara Falls	8.0	0.03	0.00	ND
NY:Syracuse	34.0	0.04	0.01	ND
NY:Yaphank	23.0	0.06	0.01	<sup>7</sup> Be: 64.3±47.1
OH:Painesville	0.0	0.00	0.00	ND
OH:Toledo	40.0	0.04	0.01	ND
OK:Oklahoma City	53.0	0.07	0.02	ND
OR:Portland	29.6	0.05	0.01	ND
PA:Harrisburg	70.0	0.09	0.02	<sup>212</sup> Pb: 5.1±4.2 <sup>7</sup> Be: 50.8±27.3
SC:Barnwell	24.8	0.06	0.01	ND
SC:Columbia	34.6	0.03	0.01	ND
TN:Knoxville	60.0	0.12	0.02	ND
TN:Nashville	66.0	0.20	0.03	<sup>7</sup> Be: 60.6±36.7
TX:Austin	120.0	0.06	0.04	ND
TX:El Paso	53.0	0.03	0.02	ND
UT:Salt Lake City	31.0	0.04	0.01	ND

**Table 6 (continued)**

Gross Beta and Specific Gamma in Precipitation

May 1992

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m <sup>2</sup>	$\pm 2\sigma$	Activity pCi/L $\pm 2\sigma$
VA:Lynchburg	59.6	0.26	0.03	ND
WA:Olympia	23.6	0.03	0.01	ND
WI:Madison	44.0	0.02	0.01	ND

Note:  $\sigma$  = Counting Error. ND = Not Detectable.

**Table 7**  
**Gross Beta and Specific Gamma in Precipitation**  
**June 1992**

Location	Depth (mm)	Gross Beta Activity		Specific Gamma Activity	
		nCi/m <sup>2</sup>	±2σ	pCi/L	±2σ
AL:Montgomery	152.0	0.17	0.05	ND	
AR:Little Rock	70.0	0.11	0.02	ND	
CO:Denver	27.6	0.04	0.01	ND	
CT:Hartford	111.0	0.03	0.03	ND	
DE:Wilmington	106.0	0.20	0.04	ND	
FL:Jacksonville	173.4	0.11	0.05	ND	
FL:Miami	205.0	0.03	0.05	ND	
HI:Honolulu	13.0	0.04	0.01	ND	
ID:Boise	57.0	0.13	0.02	ND	
ID:Idaho Falls	8.0	0.01	0.00	ND	
IL:Chicago	35.2	0.02	0.01	ND	
LA:New Orleans	137.0	0.08	0.04	ND	
ME:Augusta	73.0	0.44	0.04	<sup>7</sup> Be: 107±44	
MI:Lansing	57.0	0.06	0.02	ND	
MN:Minneapolis	49.0	0.10	0.02	ND	
MO:Jefferson City	66.0	0.10	0.02	ND	
MS:Jackson	42.0	0.02	0.01	ND	
NC:Charlotte	91.0	0.23	0.04	<sup>7</sup> Be: 31.7±31.0	
NC:Wilmington	107.0	0.11	0.03	ND	
ND:Bismarck	86.6	0.06	0.03	ND	
NH:Concord	110.6	0.12	0.04	ND	
NJ:Trenton	123.0	0.15	0.04	ND	
NM:Santa Fe	136.0	0.07	0.03	ND	
NY:Albany	66.0	0.03	0.02	ND	
NY:Niagara Falls	75.0	0.13	0.03	<sup>7</sup> Be: 85.6±39.0 <sup>212</sup> Pb: 6.4±5.0	
NY:Syracuse	8.0	0.01	0.00	ND	
NY:Yaphank	142.0	-0.13	0.01	ND	
OH:Painesville	61.4	0.24	0.03	ND	
OH:Toledo	32.0	0.04	0.01	ND	
OK:Oklahoma City	65.0	0.12	0.02	ND	
OR:Portland	10.0	0.01	0.00	ND	
PA:Harrisburg	69.6	0.17	0.03	ND	
SC:Barnwell	113.8	0.11	0.03	<sup>212</sup> Pb: 9.7±7.4	
SC:Columbia	176.6	0.21	0.05	ND	
TN:Knoxville	48.0	0.07	0.02	ND	
TN:Nashville	139.8	0.25	0.05	ND	
TX:Austin	80.0	0.09	0.02	ND	
UT:Salt Lake City	6.4	0.01	0.00	<sup>7</sup> Be: 53.3±44.6	

**Table 7 (continued)**

Gross Beta and Specific Gamma in Precipitation

June 1992

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m <sup>2</sup>	$\pm 2\sigma$	Activity pCi/L $\pm 2\sigma$
VA:Lynchburg	43.0	0.43	0.03	ND
WA:Olympia	30.0	0.05	0.01	ND
WI:Madison	20.0	0.03	0.01	ND

Note:  $\sigma$  = Counting Error. ND = Not Detectable.

**Table 8**  
**Tritium in Precipitation**

April–June 1992

Location	April 1992		May 1992		June 1992	
	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$
AL:Montgomery	0.2	0.2	0.1	0.2	0.1	0.2
AR:Little Rock	0.1	0.2	0.1	0.2	0.2	0.2
AZ:Phoenix	0.2	0.2	0.1	0.2	NS	
CO:Denver	0.2	0.2	0.1	0.2	0.2	0.2
CT:Hartford	0.1	0.2	0.2	0.2	0.1	0.2
DE:Wilmington	0.2	0.2	0.1	0.2	0.2	0.2
FL:Jacksonville	0.2	0.2	0.1	0.2	0.1	0.2
FL:Miami	0.1	0.2	0.3	0.2	0.1	0.2
HI:Honolulu	0.2	0.2	0.1	0.2	0.2	0.2
ID:Boise	0.3	0.2	NS		0.2	0.2
ID:Idaho Falls	NS		0.2	0.2	0.2	0.2
IL:Chicago	0.2	0.2	0.2	0.2	0.1	0.2
LA:New Orleans	0.2	0.2	0.1	0.2	0.1	0.2
ME:Augusta	NS		NS		0.2	0.2
MI:Lansing	0.1	0.2	0.2	0.2	0.2	0.2
MN:Minneapolis	0.2	0.2	0.1	0.2	0.2	0.2
MO:Jefferson City	0.1	0.2	0.2	0.2	0.1	0.2
MS:Jackson	0.2	0.2	0.2	0.2	0.1	0.2
NC:Charlotte	0.1	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	0.1	0.2	0.1	0.2	0.2	0.2
NH:Concord	0.3	0.2	0.1	0.2	0.1	0.2
NJ:Trenton	0.1	0.2	0.2	0.2	0.1	0.2
NM:Santa Fe	NS		0.2	0.2	0.1	0.2
NV:Las Vegas	0.3	0.2	NS		NS	
NY:Albany	0.2	0.2	0.1	0.2	0.2	0.2
NY:Niagara Falls	0.1	0.2	0.2	0.2	0.3	0.2
NY:Syracuse	NS		0.1	0.2	0.1	0.2
NY:Yaphank	0.2	0.2	0.2	0.2	0.1	0.2
OH:Painesville	0.2	0.2	0.2	0.2	0.2	0.2
OH:Toledo	0.2	0.2	0.2	0.2	0.2	0.2
OK:Oklahoma City	0.2	0.2	0.1	0.2	0.2	0.2
OR:Portland	0.3	0.2	0.2	0.2	0.3	0.2
PA:Harrisburg	0.1	0.2	0.1	0.2	0.2	0.2
SC:Barnwell	0.3	0.2	0.6	0.2	0.3	0.2
SC:Columbia	0.2	0.2	0.2	0.2	0.1	0.2
TN:Knoxville	0.2	0.2	0.1	0.2	0.3	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	0.2	0.2
TX:El Paso	0.3	0.2	0.1	0.2	NS	
UT:Salt Lake City	0.3	0.2	0.1	0.2	0.2	0.2

**Table 8 (continued)**  
**Tritium in Precipitation**  
**April–June 1992**

Location	April 1992		May 1992		June 1992	
	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$
VA:Lynchburg	0.2	0.2	0.2	0.2	0.2	0.2
WA:Olympia	0.3	0.2	0.2	0.2	0.2	0.2
WI:Madison	0.2	0.2	0.2	0.2	0.2	0.2

Note:  $\sigma$  = 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.

Table 9 contains the plutonium and uranium results for the period January–June 1992. Table 10 contains the plutonium and uranium in precipitation data for January–June 1992. Values are based upon composites of the March, April, and May samples. Samples from these three months only are analyzed annually because, due to the spring rains, they usually contain the year's highest concentrations of plutonium and uranium.

**Table 9**  
**Plutonium and Uranium In Airborne Particulates**  
**January–June 1992 Composites**

Location	$^{238}\text{Pu}$		$^{239-240}\text{Pu}$		$^{234}\text{U}$		$^{235}\text{U}$		$^{238}\text{U}$	
	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$
AL:Montgomery	0.4	0.3	0.1	0.1	12.3	1.5	0.5	0.3	10.1	1.3
AR:Little Rock	0.4	0.4	0.5	0.4	31.0	3.9	0.8	0.6	24.7	3.4
AZ:Phoenix	0.9	0.7	0.4	0.4	31.9	4.9	1.2	0.9	22.5	4.0
CA:Berkeley	0.1	0.2	ND		8.4	1.3	0.4	0.3	6.0	1.1
CA:Los Angeles	0.7	0.5	0.1	0.2	31.2	4.0	0.5	0.6	20.9	3.2
CO:Denver	0.1	0.4	0.8	0.5	31.0	4.0	1.5	0.8	29.8	3.9
CT:Hartford	0.2	0.3	0.5	0.3	12.8	1.9	0.4	0.3	11.5	1.8
DE:Wilmington	ND		0.1	0.1	NA		NA		NA	
FL:Jacksonville	0.4	0.6	0.1	0.3	28.1	3.1	1.4	0.7	25.3	2.9
FL:Miami	ND		0.2	0.3	16.5	2.5	1.4	0.7	17.8	2.5
HI:Honolulu	0.1	0.2	ND		6.3	1.2	0.2	0.3	5.4	1.1
IA:Iowa City	0.9	0.6	0.2	0.3	23.8	3.5	2.6	1.1	21.5	3.3
ID:Boise	0.6	0.7	0.7	0.6	31.1	4.2	1.1	0.7	26.2	3.8
ID:Idaho Falls	1.1	0.5	0.4	0.3	22.7	2.9	0.4	0.4	19.4	2.6
IL:Chicago	ND		0.1	0.4	32.6	3.5	1.3	0.7	27.1	3.1
IN:Indianapolis	0.5	0.6	0.1	0.3	33.1	5.0	2.2	1.2	24.4	4.2
KS:Topeka	0.5	0.4	0.1	0.3	20.9	3.0	0.7	0.6	18.4	2.8
KY:Frankfort	0.1	0.1	0.2	0.1	NA		NA		NA	
LA:New Orleans	0.2	0.3	ND		15.2	1.8	0.7	0.4	14.7	1.7
MA:Lawrence	0.2	0.3	0.2	0.2	17.8	2.1	0.7	0.3	16.1	1.9
ME:Augusta	ND		ND		27.2	3.5	1.3	0.7	25.3	3.4
MI:Lansing	0.4	0.3	0.4	0.2	13.3	1.6	0.4	0.3	11.5	1.5
MN:Minneapolis	0.2	0.7	0.3	0.3	22.8	4.0	1.2	0.9	21.8	3.8
MO:Jefferson City	0.2	0.2	0.2	0.2	10.4	1.3	0.6	0.3	11.2	1.4
MS:Jackson	0.3	0.4	0.2	0.3	15.7	2.4	1.0	0.6	13.8	2.2
NC:Charlotte	ND		0.1	0.2	17.9	1.8	1.1	0.4	17.1	1.8
NC:Wilmington	0.3	0.3	ND		9.3	1.4	0.5	0.3	8.6	1.3
ND:Bismarck	0.3	0.5	0.6	0.4	28.4	3.6	0.8	0.7	20.0	3.0
NE:Lincoln	0.6	0.7	0.4	0.5	31.4	5.1	1.1	1.0	23.8	4.4
NH:Concord	0.5	0.3	ND		11.6	1.6	0.7	0.3	9.6	1.4
NJ:Trenton	0.2	0.4	0.2	0.3	7.4	1.0	0.2	0.2	7.0	1.0
NM:Santa Fe	0.3	0.3	0.1	0.2	10.7	1.4	0.6	0.3	10.2	1.4
NV:Las Vegas	0.7	0.5	0.9	0.6	72.6	6.6	3.4	1.2	43.4	4.8
NY:Albany	0.6	0.5	0.7	0.5	19.0	2.7	1.2	0.6	21.2	2.9
NY:Niagara Falls	0.1	0.2	0.1	0.1	35.3	3.1	5.9	1.1	34.5	3.1
NY:Syracuse	0.2	0.3	0.1	0.2	13.4	2.0	0.6	0.4	12.9	1.9
NY:Yaphank	0.2	0.2	0.2	0.2	5.7	0.9	0.4	0.2	6.1	0.9

**Table 9 (continued)**

**Plutonium and Uranium In Airborne Particulates**

January–June 1992 Composites

Location	$^{238}\text{Pu}$		$^{239-240}\text{Pu}$		$^{234}\text{U}$		$^{235}\text{U}$		$^{238}\text{U}$	
	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$	aCi/m <sup>3</sup>	$\pm 2\sigma$
OH:Columbus	0.6	0.3	0.5	0.3	17.6	2.0	0.9	0.4	18.3	2.1
OH:Painesville	0.2	0.2	0.3	0.2	13.2	1.6	0.6	0.3	13.2	1.6
OH:Ross	0.6	0.5	0.5	0.4	31.4	3.9	1.7	0.8	35.9	4.2
OH:Toledo	0.1	0.2	0.5	0.4	19.7	3.9	1.5	1.0	17.3	3.6
OK:Oklahoma	0.8	0.6	0.1	0.3	17.1	2.4	0.9	0.6	18.2	2.5
OR:Portland	0.2	0.2	0.2	0.2	15.2	2.2	1.3	0.6	13.2	2.1
PA:Harrisburg	ND		0.1	0.1	9.6	1.4	0.6	0.4	9.4	1.5
RI:Providence	0.4	0.5	0.2	0.3	20.7	2.9	0.8	0.5	17.9	2.6
SC:Barnwell	0.4	0.2	0.2	0.1	7.1	0.8	0.2	0.1	8.1	0.9
SC:Columbia	0.1	0.2	0.1	0.2	24.3	2.3	0.8	0.4	22.7	2.2
SD:Pierre	0.2	0.4	0.7	0.5	14.7	2.0	0.9	0.5	14.0	1.9
TN:Knoxville	0.2	0.3	0.1	0.2	25.4	2.8	1.3	0.6	24.1	2.7
TN:Nashville	ND		0.2	0.2	16.7	1.9	0.8	0.4	14.2	1.7
TX:Austin	ND		0.2	0.2	6.7	0.9	0.5	0.2	5.8	0.8
TX:El Paso	0.8	0.8	1.0	1.0	54.2	7.3	2.4	1.4	49.9	7.0
UT:Salt Lake City	0.1	0.4	0.3	0.3	29.5	4.9	1.5	1.0	24.2	4.3
VA:Lynchburg	0.3	0.4	0.2	0.3	162	9	4.2	0.7	14.0	1.4
VA:Virginia Beach	ND		0.1	0.2	18.0	2.0	0.8	0.4	18.6	2.0
WA:Olympia	0.3	0.2	ND		4.5	0.9	0.2	0.2	4.2	0.8
WA:Spokane	0.7	0.6	0.3	0.4	26.6	3.5	0.9	0.6	22.9	3.1
WI:Madison	0.8	0.4	0.6	0.4	18.6	1.8	0.4	0.3	14.0	1.6

Note:  $\sigma$  = Counting Error. NA = No Analysis. ND = Not Detectable.

**Table 10**  
**Plutonium and Uranium Analyses**  
**Selected Precipitation Composite Samples**  
**January–June 1992**

Location	<sup>238</sup> Pu		<sup>239–240</sup> Pu		<sup>234</sup> U		<sup>235</sup> U		<sup>238</sup> U	
	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AL:Montgomery	ND		0.001	0.002	0.057	0.022	ND		0.045	0.017
AR:Little Rock	0.003	0.006	0.001	0.003	0.054	0.020	0.002	0.004	0.035	0.015
AZ:Phoenix	0.011	0.008	0.000	0.002	0.049	0.019	0.001	0.004	0.034	0.015
CA:Berkeley	0.001	0.006	ND		0.055	0.018	0.001	0.004	0.033	0.014
CO:Denver	0.002	0.006	0.003	0.004	0.079	0.023	0.003	0.005	0.023	0.013
CT:Hartford	0.010	0.007	0.000	0.002	0.098	0.021	0.004	0.004	0.070	0.018
DE:Wilmington	0.002	0.005	0.002	0.004	0.061	0.020	0.012	0.009	0.051	0.018
FL:Jacksonville	ND		0.002	0.005	0.068	0.018	0.003	0.004	0.034	0.013
FL:Miami	0.003	0.007	0.002	0.004	0.097	0.026	ND		0.017	0.016
HI:Honolulu	0.003	0.006	ND		0.063	0.022	0.007	0.008	0.027	0.015
ID:Boise	0.001	0.007	ND		0.058	0.022	0.002	0.003	0.040	0.017
ID:Idaho Falls	ND		0.001	0.004	0.066	0.026	ND		0.033	0.018
IL:Chicago	0.000	0.004	0.000	0.001	0.065	0.020	0.003	0.004	0.030	0.013
LA:New Orleans	0.009	0.010	0.018	0.010	0.044	0.015	ND		0.028	0.012
MI:Lansing	0.000	0.006	ND		0.060	0.019	0.001	0.003	0.019	0.011
MN:Minneapolis	0.007	0.006	ND		0.058	0.021	0.004	0.006	0.025	0.014
MO:Jefferson City	0.001	0.006	0.000	0.001	0.040	0.016	0.001	0.003	0.025	0.012
MS:Jackson	0.003	0.006	ND		0.080	0.021	0.001	0.003	0.023	0.011
NC:Charlotte	0.004	0.006	ND		0.065	0.020	0.008	0.007	0.047	0.017
NC:Wilmington	0.006	0.006	0.004	0.005	0.081	0.022	0.006	0.006	0.062	0.018
ND:Bismarck	0.001	0.007	0.004	0.007	0.132	0.033	0.003	0.005	0.047	0.019
NH:Concord	0.006	0.006	0.001	0.002	0.079	0.021	0.006	0.006	0.023	0.012
NJ:Trenton	0.015	0.010	0.002	0.005	0.115	0.026	0.003	0.004	0.064	0.019
NM:Santa Fe	0.005	0.006	0.005	0.005	0.050	0.017	0.001	0.004	0.025	0.012
NV:Las Vegas	0.002	0.007	0.005	0.006	0.041	0.017	0.002	0.004	0.024	0.012
NY:Albany	0.007	0.007	0.000	0.001	0.043	0.015	0.010	0.008	0.023	0.012
NY:New York City	ND		ND		0.161	0.043	ND		0.106	0.035
NY:Niagara Falls	0.004	0.006	0.002	0.005	0.067	0.021	0.003	0.005	0.038	0.016
NY:Syracuse	0.000	0.005	0.000	0.001	0.067	0.023	0.002	0.006	0.050	0.020
NY:Yaphank	0.001	0.004	0.001	0.002	0.055	0.019	ND		0.011	0.013
OH:Painesville	0.004	0.006	0.000	0.001	0.060	0.023	0.002	0.006	0.031	0.016
OH:Toledo	0.000	0.005	0.001	0.002	0.055	0.021	0.001	0.004	0.028	0.014
OK:Oklahoma City	0.005	0.005	ND		0.055	0.018	0.000	0.003	0.019	0.010
OR:Portland	0.007	0.008	0.002	0.003	0.056	0.017	ND		0.031	0.013
PA:Harrisburg	0.003	0.004	0.001	0.002	0.088	0.021	0.000	0.001	0.051	0.016
SC:Barnwell	0.000	0.005	0.002	0.004	0.074	0.019	0.003	0.004	0.020	0.010
SC:Columbia	ND		0.002	0.005	0.077	0.021	0.025	0.012	0.054	0.018

**Table 10 (continued)**

Plutonium and Uranium Analyses  
Selected Precipitation Composite Samples

January–June 1992

Location	$^{238}\text{Pu}$		$^{239-240}\text{Pu}$		$^{234}\text{U}$		$^{235}\text{U}$		$^{238}\text{U}$	
	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
TN:Knoxville	0.006	0.007	0.000	0.003	0.053	0.015	0.002	0.003	0.041	0.013
TN:Nashville	0.009	0.009	0.001	0.005	0.077	0.028	0.009	0.010	0.047	0.025
TX:Austin	0.000	0.004	0.004	0.005	0.107	0.030	0.011	0.010	0.030	0.016
TX:El Paso	0.001	0.009	0.003	0.006	0.016	0.012	0.004	0.007	0.019	0.015
UT:Salt Lake City	0.006	0.009	0.002	0.004	0.051	0.018	0.003	0.005	0.018	0.011
VA:Lynchburg	0.009	0.010	ND		0.132	0.026	0.004	0.005	0.034	0.014
WA:Olympia	ND		ND		0.058	0.019	0.001	0.003	0.019	0.010
WI:Madison	0.006	0.007	0.001	0.004	0.075	0.023	0.003	0.005	0.026	0.014

Note:  $\sigma$  = Counting Error. NA = No Analysis. ND = Not Detectable.

## 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 11 contains the tritium concentration data for April–June 1992.

**Table 11**  
**Tritium in Surface Water**  
**April–June 1992**

Location	Source	Date Collected	<sup>3</sup> H	
			nCi/L	±2σ
AL:Decatur	Tennessee River	04/14/92	0.3	0.2
AL:Gordon	Chattahoochee River	04/16/92	0.5	0.2
AL:Scottsboro	Tennessee River	04/15/92	0.4	0.2
AR:Little Rock	Arkansas River	06/10/92	0.2	0.2
CA:Clay Station	Folsom S. Canal	04/14/92	0.1	0.2
CA:Diablo Canyon	Pacific Ocean	04/08/92	0.1	0.2
CA:Eureka	Humboldt Bay	04/09/92	0.2	0.2
CA:San Onofre	Pacific Ocean	06/10/92	0.1	0.2
CO:Platteville	South Platte River	04/15/92	0.2	0.2
CT:East Haddam	Connecticut River	04/08/92	0.2	0.2
CT:Waterford	Long Island Sound	04/08/92	0.2	0.2
FL:Crystal River	Gulf Of Mexico	04/04/92	0.1	0.2
FL:Ft. Pierce	Atlantic Ocean	04/07/92	0.1	0.2
FL:Homestead	Biscayne Bay	04/20/92	0.3	0.2
GA:Baxley	Altamaha River	04/07/92	0.1	0.2
IA:Cedar Rapids	Cedar River	04/08/92	0.1	0.2
IL:E. Moline	Mississippi River	04/10/92	0.1	0.2
IL:Morris	Illinois River	04/03/92	0.1	0.2
IL:Zion	Lake Michigan	05/15/92	0.2	0.2
LA:New Orleans	Mississippi River	04/01/92	0.1	0.2
MA:Plymouth	Cape Cod Bay	04/03/92	0.1	0.2
MD:Conowingo	Susquehanna River	04/06/92	0.1	0.2
MD:Lusby	Chesapeake Bay	04/13/92	0.2	0.2
ME:Wiscasset	Montseway Bay	04/07/92	0.2	0.2
MI:Bridgman	Lake Michigan	04/13/92	0.5	0.2
MI:Charlevoix	Lake Michigan	04/06/92	0.3	0.2
MI:Monroe	Lake Erie	04/06/92	0.2	0.2
MI:South Haven	Lake Michigan	04/13/92	0.1	0.2
MN:Monticello	Mississippi River	04/08/92	0.2	0.2
MN:Red Wing	Mississippi River	05/14/92	0.2	0.2
MS:Port Gibson	Mississippi River	04/07/92	0.1	0.2
NC:Charlotte	Catawba River	04/02/92	0.5	0.2
NC:Southport	Atlantic Ocean	05/11/92	0.2	0.2
NE:Rulo	Missouri River	05/02/92	0.2	0.2
NJ:Bayside	Delaware River	04/14/92	0.1	0.2
NJ:Oyster Creek	Oyster Creek	04/16/92	0.1	0.2
NV:Boulder City	Colorado River	04/02/92	0.2	0.2

**Table 11 (continued)**  
**Tritium in Surface Water**  
**April–June 1992**

Location	Source	Date Collected	<sup>3</sup> H	
			nCi/L	±2σ
NY:Chelsea	Hudson River	04/06/92	0.2	0.2
NY:Ossining	Hudson River	04/15/92	0.2	0.2
NY:Oswego	Lake Ontario	06/24/92	0.2	0.2
OH:Toledo	Lake Erie	04/03/92	0.2	0.2
OR:Bradwood	Columbia River	05/11/92	0.1	0.2
PA:Danville	Susquehanna River	04/15/92	0.2	0.2
PA:Philadelphia	Delaware River-Baxter	04/21/92	0.1	0.2
PA:Philadelphia	Schuylkill R.-Queen	04/21/92	0.2	0.2
PA:Philadelphia	Schuylkill R.-Belmont	04/23/92	0.3	0.2
SC:Allendale	Savannah River	04/30/92	1.7	0.2
SC:Broad River	Broad River	04/15/92	0.3	0.2
SC:Hartsville	Lake Robinson	04/06/92	2.9	0.2
TN:Daisy	Tennessee River	04/22/92	0.1	0.2
TN:Kingston	Clinch River	04/07/92	0.2	0.2
TX:El Paso	Rio Grande	04/09/92	0.1	0.2
TX:Matagorda	Colorado River	04/07/92	0.1	0.2
VA:Doswell	North Anna River	04/09/92	4.2	0.2
VT:Vernon	Connecticut River	05/02/92	0.1	0.2
WA:Northport	Columbia River	05/26/92	0.2	0.2
WA:Richland	Columbia River	06/11/92	0.3	0.2
WI:Two Creeks	Lake Michigan	04/13/92	0.2	0.2
WI:Victory	Mississippi River	04/14/92	0.2	0.2
WV:Wheeling	Ohio River	04/03/92	0.2	0.2

Note:  $\sigma$  = 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 12 contains the data from drinking water samples for April–June 1992.

**Table 12**  
**Tritium in Drinking Water**

April–June 1992

Location	Date Collected	<sup>3</sup> H	
		nCi/L	±2σ
AK:Fairbanks	04/23/92	0.3	0.2
AL:Dothan	04/16/92	0.2	0.2
AL:Montgomery	06/02/92	0.2	0.2
AL:Muscle Shoals	04/14/92	0.3	0.2
AL:Scottsboro	04/15/92	0.2	0.2
AR:Little Rock	06/10/92	0.2	0.2
CA:Berkeley	04/02/92	0.2	0.2
CA:Los Angeles	04/06/92	0.1	0.2
CO:Denver	04/08/92	0.2	0.2
CO:Platteville	04/03/92	0.2	0.2
CT:Hartford	04/03/92	0.1	0.2
DE:Dover	04/01/92	0.2	0.2
FL:Miami	04/01/92	0.1	0.2
FL:Tampa	04/03/92	0.3	0.2
GA:Baxley	04/07/92	0.1	0.2
GA:Savannah	06/09/92	0.2	0.2
HI:Honolulu	04/28/92	0.1	0.2
IA:Cedar Rapids	04/08/92	0.3	0.2
ID:Boise	04/09/92	0.3	0.2
ID:Idaho Falls	04/06/92	0.2	0.2
IL:Morris	06/20/92	0.1	0.2
IL:W. Chicago	04/06/92	0.1	0.2
KS:Topeka	04/06/92	0.1	0.2
LA:New Orleans	05/01/92	0.2	0.2
MD:Baltimore	04/01/92	0.1	0.2
MD:Conowingo	04/06/92	0.1	0.2
ME:Augusta	04/16/92	0.2	0.2
MI:Detroit	04/03/92	0.2	0.2
MI:Grand Rapids	04/09/92	0.2	0.2
MN:Minneapolis	04/30/92	0.1	0.2
MN:Red Wing	04/15/92	0.2	0.2
MO:Jefferson City	04/01/92	0.3	0.2
MS:Jackson	04/07/92	0.2	0.2
MS:Port Gibson	04/07/92	0.0	0.0
MT:Helena	04/06/92	0.2	0.2
NC:Charlotte	04/02/92	0.3	0.2
NC:Wilmington	05/07/92	0.1	0.2
ND:Bismarck	04/01/92	0.3	0.2
NE:Lincoln	04/06/92	0.1	0.2
NH:Concord	06/24/92	0.1	0.2
NJ:Trenton	04/06/92	0.2	0.2

**Table 12 (continued)**  
**Tritium in Drinking Water**  
**April–June 1992**

Location	Date Collected	<sup>3</sup> H	
		nCi/L	±2σ
NJ:Waretown	04/02/92	0.1	0.2
NM:Santa Fe	05/11/92	0.2	0.2
NV:Las Vegas	04/06/92	0.4	0.2
NY:Albany	04/06/92	0.2	0.2
NY:New York City	04/06/92	0.2	0.2
NY:Niagara Falls	04/06/92	0.2	0.2
NY:Syracuse	06/29/92	0.3	0.2
OH:Cincinnati	06/29/92	0.1	0.2
OH:Columbus	04/08/92	0.2	0.2
OH:East Liverpool	04/10/92	0.2	0.2
OH:Painesville	04/06/92	0.2	0.2
OH:Toledo	04/01/92	0.4	0.2
OK:Oklahoma City	04/08/92	0.2	0.2
OR:Portland	04/10/92	0.1	0.2
PA:Columbia	04/02/92	0.1	0.2
PA:Harrisburg	04/02/92	0.1	0.2
PA:Philadelphia-Baxter	04/21/92	0.1	0.2
PA:Philadelphia-Queen	04/21/92	0.2	0.2
PA:Philadelphia	04/21/92	0.2	0.2
PA:Pittsburgh	04/08/92	0.2	0.2
PC:Corozal	04/07/92	0.1	0.2
RI:Providence	04/16/92	0.2	0.2
SC:Barnwell	04/02/92	0.1	0.2
SC:Columbia	04/03/92	0.3	0.2
SC:Hartsville	04/06/92	0.1	0.2
SC:Jenkinsville	04/03/92	0.3	0.2
SC:Seneca	04/13/92	0.3	0.2
TN:Chattanooga	04/02/92	0.2	0.2
TN:Knoxville	04/01/92	0.2	0.2
VA:Doswell	05/06/92	0.2	0.2
VA:Lynchburg	04/01/92	0.1	0.2
VA:Virginia Beach	04/02/92	0.2	0.2
WA:Richland	06/11/92	0.1	0.2
WA:Seattle	04/03/92	ND	
WI:Genoa City	04/14/92	0.2	0.2
WI:Madison	04/01/92	0.1	0.2

Note:  $\sigma$  = 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  $\text{CaF}_2:\text{Mn}$  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.

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

## 4. Milk Program

### Pasteurized Milk

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 approximately 55 sampling sites with at least one located in most states, 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 13–15 contain the concentrations of radionuclides in pasteurized milk for April–June 1992. Table 16 contains the concentrations of strontium-90 in pasteurized milk EPA Regional Composites for April 1992.

**Table 13**  
**Radionuclides in Pasteurized Milk**  
 April 1992

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
AL:Montgomery	04/09/92	1.87	0.09	ND		ND		ND	
AR:Little Rock	04/14/92	1.58	0.14	ND		ND		ND	
AZ:Phoenix	04/09/92	1.55	0.08	ND		ND		ND	
CA:Los Angeles	04/02/92	1.59	0.06	ND		ND		ND	
CA:Sacramento	04/01/92	1.58	0.09	ND		ND		ND	
CO:Denver	04/20/92	1.55	0.06	ND		ND		ND	
CT:Hartford	04/06/92	1.64	0.09	ND		ND		ND	
DE:Dover	04/28/92	1.54	0.08	ND		ND		ND	
GA:Atlanta	04/06/92	1.50	0.09	ND		ND		ND	
IA:Des Moines	04/06/92	1.57	0.08	ND		ND		ND	
IN:Indianapolis	04/06/92	1.50	0.10	ND		ND		ND	
KS:Wichita	04/27/92	1.41	0.10	ND		ND		ND	
KY:Louisville	04/07/92	1.75	0.07	ND		ND		ND	
MA:Boston	04/10/92	1.58	0.08	ND		ND		ND	
MD:Baltimore	04/02/92	1.56	0.12	ND		ND		ND	
MI:Detroit	04/14/92	1.72	0.14	ND		ND		ND	
MI:Grand Rapids	04/06/92	1.57	0.06	ND		ND		ND	
MN:St. Paul	04/01/92	1.64	0.06	ND		ND		ND	
MO:Kansas City	04/17/92	1.61	0.12	ND		ND		ND	
MO:St. Louis	04/22/92	1.62	0.08	ND		ND		ND	
MS:Jackson	04/06/92	1.60	0.09	ND		ND		ND	
MT:Helena	04/21/92	1.56	0.09	ND		ND		ND	
NC:Charlotte	04/30/92	1.50	0.08	ND		ND		ND	
ND:Minot	04/28/92	1.76	0.08	ND		ND		ND	
NE:Omaha	04/28/92	1.35	0.10	ND		ND		ND	
NJ:Trenton	04/08/92	1.67	0.07	ND		ND		ND	
NM:Albuquerque	04/21/92	1.55	0.08	ND		ND		ND	
NV:Las Vegas	04/05/92	1.72	0.08	ND		ND		ND	
NY:Buffalo	04/14/92	1.54	0.12	ND		ND		ND	
NY:New York City	04/06/92	1.56	0.09	ND		ND		ND	
NY:Syracuse	04/07/92	1.48	0.09	ND		ND		ND	
OH:Cincinnati	04/28/92	1.62	0.08	ND		ND		ND	
OH:Cleveland	04/14/92	1.63	0.08	ND		ND		ND	
OR:Portland	04/07/92	1.61	0.06	ND		ND		ND	
PA:Philadelphia	04/06/92	1.56	0.09	ND		ND		ND	
PA:Pittsburgh	04/06/92	1.55	0.12	ND		ND		ND	
PC:Cristobal	04/22/92	1.68	0.08	8	2	ND		ND	

**Table 13 (continued)**  
**Radionuclides in Pasteurized Milk**  
 April 1992

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
PR:San Juan	04/08/92	1.63	0.08	ND		ND		ND	
SC:Charleston	04/27/92	1.91	0.10	ND		ND		ND	
SD:Rapid City	04/02/92	1.56	0.08	ND		ND		ND	
TN:Chattanooga	04/06/92	1.58	0.08	ND		ND		ND	
TN:Knoxville	04/06/92	1.55	0.09	ND		ND		ND	
TN:Memphis	04/13/92	1.56	0.09	ND		ND		ND	
TX:Austin	04/01/92	1.54	0.08	ND		ND		ND	
TX:Ft. Worth	04/15/92	1.58	0.08	ND		ND		ND	
VT:Montpelier	04/13/92	1.54	0.14	ND		ND		ND	
WA:Seattle	04/01/92	1.67	0.08	ND		ND		ND	
WA:Spokane	04/06/92	1.63	0.08	ND		ND		ND	
WV:Charleston	04/14/92	1.61	0.08	ND		ND		ND	

Note:  $\sigma$  = Counting Error. ND = Not Detectable.

**Table 14**  
**Radionuclides in Pasteurized Milk**  
 May 1992

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AL:Montgomery	05/08/92	1.43	0.13	ND		ND		ND	
AR:Little Rock	05/04/92	2.09	0.09	ND		ND		ND	
AZ:Phoenix	05/14/92	1.55	0.10	ND		ND		ND	
CA:Sacramento	05/03/92	1.58	0.07	ND		ND		ND	
CA:San Francisco	05/10/92	1.78	0.09	ND		ND		ND	
CO:Denver	05/29/92	1.58	0.09	ND		ND		ND	
DE:Dover	05/28/92	1.63	0.06	ND		ND		ND	
GA:Atlanta	05/06/92	2.06	0.09	ND		ND		ND	
HI:Honolulu	05/22/92	1.63	0.10	ND		ND		ND	
IA:Des Moines	05/05/92	1.64	0.10	ND		ND		ND	
IL:Chicago	05/07/92	1.57	0.08	ND		ND		ND	
IN:Indianapolis	05/04/92	1.48	0.10	ND		ND		ND	
KS:Wichita	05/29/92	1.45	0.14	ND		ND		ND	
KY:Louisville	05/05/92	1.62	0.06	ND		ND		ND	
LA:New Orleans	05/04/92	1.85	0.07	ND		ND		ND	
MA:Boston	05/06/92	1.51	0.10	ND		ND		ND	
MD:Baltimore	05/08/92	1.53	0.12	ND		ND		ND	
MI:Detroit	05/14/92	1.66	0.12	ND		ND		ND	
MI:Grand Rapids	05/05/92	1.73	0.09	ND		ND		ND	
MN:St. Paul	05/06/92	1.63	0.10	ND		ND		ND	
MO:St. Louis	05/05/92	1.56	0.10	ND		ND		ND	
MS:Jackson	05/06/92	1.53	0.09	ND		ND		ND	
MT:Helena	05/08/92	1.57	0.10	ND		ND		ND	
ND:Minot	05/28/92	1.55	0.08	ND		ND		ND	
NE:Omaha	05/28/92	1.55	0.08	ND		ND		ND	
NJ:Trenton	05/06/92	1.66	0.09	ND		ND		ND	
NM:Albuquerque	05/12/92	1.54	0.10	ND		ND		ND	
NV:Las Vegas	05/20/92	1.49	0.12	ND		ND		ND	
NY:Buffalo	05/18/92	1.70	0.10	ND		ND		ND	
NY:New York City	05/04/92	1.43	0.10	ND		ND		ND	
NY:Syracuse	05/14/92	1.58	0.14	ND		ND		ND	
OH:Cincinnati	05/28/92	1.56	0.07	ND		ND		ND	
OH:Cleveland	05/20/92	1.81	0.09	ND		ND		ND	
OR:Portland	05/05/92	1.78	0.09	ND		ND		ND	
PA:Philadelphia	05/04/92	1.62	0.10	ND		ND		ND	
PA:Pittsburgh	05/04/92	1.50	0.08	ND		ND		ND	
PC:Cristobal	05/29/92	1.60	0.08	8	2	ND		ND	

**Table 14 (continued)**  
**Radionuclides in Pasteurized Milk**  
**May 1992**

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
PR:San Juan	05/08/92	2.03	0.09	ND		ND		ND	
SC:Charleston	05/21/92	1.56	0.10	ND		ND		ND	
SD:Rapid City	05/12/92	1.61	0.08	ND		ND		ND	
TN:Chattanooga	05/26/92	1.76	0.09	ND		ND		ND	
TN:Memphis	05/19/92	1.61	0.10	ND		ND		ND	
TX:Austin	05/26/92	1.57	0.09	ND		ND		ND	
TX:Ft. Worth	05/21/92	1.37	0.12	ND		ND		ND	
VA:Norfolk	05/01/92	1.57	0.08	ND		ND		ND	
VT:Montpelier	05/28/92	1.51	0.06	ND		ND		ND	
WA:Seattle	05/05/92	1.54	0.10	ND		ND		ND	
WA:Spokane	05/18/92	1.61	0.10	ND		ND		ND	
WV:Charleston	05/20/92	1.53	0.10	ND		ND		ND	

Note:  $\sigma$  = Counting Error. ND = Not Detectable.

**Table 15**  
**Radionuclides in Pasteurized Milk**  
 June 1992

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
AL:Montgomery	06/05/92	1.58	0.08	ND		ND		ND	
AR:Phoenix	06/18/92	1.57	0.08	ND		ND		ND	
CA:Los Angeles	06/11/92	1.66	0.08	ND		ND		ND	
CA:Sacramento	06/02/92	1.60	0.12	ND		ND		ND	
CA:San Francisco	06/02/92	1.75	0.08	ND		ND		ND	
CO:Denver	06/15/92	1.50	0.08	ND		ND		ND	
DE:Dover	06/17/92	1.45	0.10	ND		ND		ND	
GA:Atlanta	06/01/92	1.45	0.12	ND		ND		ND	
HI:Honolulu	06/23/92	1.58	0.06	ND		ND		ND	
IA:Des Moines	06/02/92	1.38	0.13	ND		ND		ND	
IL:Chicago	06/04/92	1.56	0.08	ND		ND		ND	
IN:Indianapolis	06/02/92	1.58	0.08	ND		ND		ND	
KY:Louisville	06/02/92	1.60	0.08	ND		ND		ND	
LA:New Orleans	06/23/92	1.51	0.12	ND		ND		ND	
MA:Boston	06/12/92	1.47	0.10	ND		ND		ND	
MD:Baltimore	06/05/92	1.60	0.12	ND		ND		ND	
MI:Detroit	06/10/92	1.62	0.08	ND		ND		ND	
MI:Grand Rapids	06/08/92	1.57	0.08	ND		ND		ND	
MN:St. Paul	06/02/92	1.62	0.09	ND		ND		ND	
MO:Kansas City	06/19/92	1.68	0.14	ND		ND		ND	
MO:St. Louis	06/03/92	1.61	0.12	ND		ND		ND	
MS:Jackson	06/02/92	1.56	0.08	ND		ND		ND	
MT:Helena	06/18/92	1.57	0.08	ND		ND		ND	
NC:Charlotte	06/01/92	1.57	0.08	ND		ND		ND	
ND:Minot	06/29/92	1.61	0.08	ND		ND		ND	
NE:Omaha	06/24/92	1.56	0.08	ND		ND		ND	
NJ:Trenton	06/05/92	1.59	0.06	ND		ND		ND	
NM:Albuquerque	06/09/92	1.47	0.08	ND		ND		ND	
NY:Buffalo	06/03/92	1.57	0.08	ND		ND		ND	
NY:New York City	06/08/92	1.57	0.08	ND		ND		ND	
NY:Syracuse	06/01/92	1.61	0.08	ND		ND		ND	
OH:Cincinnati	06/26/92	1.60	0.07	ND		ND		ND	
OH:Cleveland	06/25/92	1.57	0.10	ND		ND		ND	
OR:Portland	06/02/92	1.51	0.14	ND		ND		ND	
PA:Philadelphia	06/08/92	1.60	0.14	ND		ND		ND	
PA:Pittsburgh	06/08/92	1.49	0.08	ND		ND		ND	
PC:Cristobal	06/15/92	1.51	0.08	11	3	ND		ND	

**Table 15 (continued)**  
**Radionuclides in Pasteurized Milk**  
**June 1992**

Location	Date Collected	K		<sup>137</sup> Cs		<sup>140</sup> Ba		<sup>131</sup> I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
PR:San Juan	06/04/92	1.55	0.07	3	2	ND		ND	
SC:Charleston	06/25/92	1.51	0.08	ND		ND		ND	
TN:Chattanooga	06/08/92	1.66	0.08	ND		ND		ND	
TN:Knoxville	06/02/92	1.57	0.08	ND		ND		ND	
TX:Austin	06/17/92	1.54	0.08	ND		ND		ND	
TX:Ft. Worth	06/08/92	1.56	0.11	ND		ND		ND	
VA:Norfolk	06/04/92	1.57	0.06	ND		ND		ND	
VT:Montpelier	06/22/92	1.56	0.08	ND		ND		ND	
WA:Seattle	06/02/92	1.60	0.08	ND		ND		ND	
WA:Spokane	06/02/92	1.57	0.08	ND		ND		ND	
WV:Charleston	06/15/92	1.43	0.08	ND		ND		ND	

Note:  $\sigma$  = Counting Error. ND = Not Detectable.

**Table 16**  
**Strontium-90 in Pasteurized Milk**  
**EPA Regional Composites**  
 April 1992

EPA Region	Collection Date	<sup>90</sup> Sr	
		pCi/L	$\pm 2\sigma$
I	04/09/92	1.3	0.3
II	04/15/92	1.1	0.1
III	04/15/92	1.4	0.3
IV	04/15/92	1.8	0.3
V	04/16/92	1.1	1.0
VI	04/16/92	1.0	0.7
VII	04/15/92	1.1	0.2
VIII	04/13/92	1.5	0.8
IX	04/15/92	0.1	0.4
X	04/15/92	0.7	1.2

Note:  $\sigma$  = Counting Error. NA = Not Analyzed.

## 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*.

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