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Eastern Environmental  
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Radiation

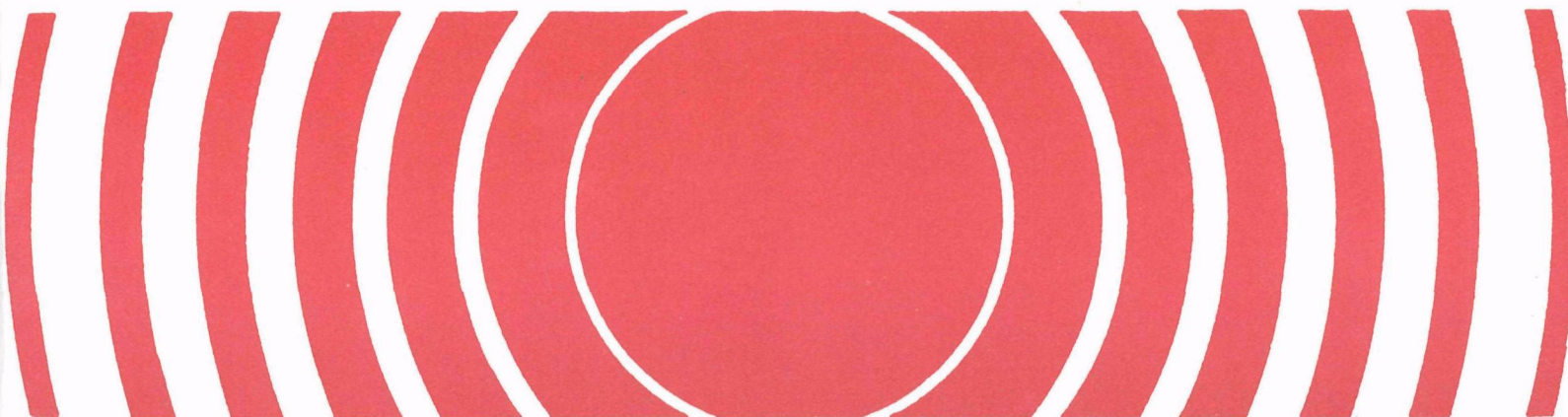
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# Environmental Radiation Data

## Report 51

July 1987 - September 1987



ENVIRONMENTAL

RADIATION

DATA

REPORT 51

July - September 1987

United States Environmental Protection Agency

Office of Radiation Programs

## Preface

Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation Programs' Eastern Environmental Radiation Facility (EERF), 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 U. S. Environmental Protection Agency's Office of Radiation Programs (ORP). The ERAMS is comprised of nationwide 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 toward 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 the EERF in processing the ERAMS samples are contained in Eastern Environmental Radiation Facility Radiochemistry Procedures Manual (EPA 520/5-84-006).

# Environmental Radiation Data

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# Environmental Radiation Data

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In 1973, the U.S. Environmental Protection Agency's Office of Radiation Programs, established the Environmental Radiation Ambient Monitoring System (ERAMS) to provide continuous, accurate, and usable environmental radiation data to the public. For completeness, ERAMS data for all specific radionuclide analyses are reported as the calculated results indicate, whether the numbers are negative, zero, or positive.

### Reporting Rationale

Frequently, concentrations of radionuclides in environmental media are close to zero. When the actual concentration of a nuclide is zero, the net counting results should statistically show a distribution of negative and positive numbers about zero. A negative value occurs when a previously determined background is subtracted from a sample result that is less than the background. Prior to July 1975, ERAMS data were not reported numerically when the results were less than a specified reporting level or minimum detectable level. The present reporting procedure allows all the data to be reported and evaluated statistically without an arbitrary cutoff of small or negative numbers. This approach will facilitate estimates of bias in the nuclide analyses and will allow better evaluation of distributions and trends in environmental data.

When reviewing the data in this report, caution should be exercised in the interpretation of individual negative values. Obviously, a negative activity value has no physical significance. Such numbers, however, are significant when taken together with other observations which indicate that the true value of a distribution is near zero. When an average of many measurements produces a result significantly less than zero, this indicates a negative bias in the measurement procedure.

#### (1) Reported Values

Specific Analyses – All specific radionuclide analyses will be reported as the counting results indicate, whether the number is negative, zero, or positive. All reported values are corrected for radioactive decay to the collection date.

Gross Analyses – The actual value of gross radioactivity measurements will be reported, unless the value is below the minimum detectable level (MDL) at the  $2\sigma$  confidence level, then  $<$  minimum detectable level will be reported.

MDL is defined as the  $3\sigma$  error of the background. A tabulation of typical MDL's is given in the following table.

#### (2) Reported Error Terms

Each reported value for specific analyses will be accompanied by a counting error term at the  $2\sigma$  (95%) confidence interval. 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.

#### (3) Significant Figures

No more than three significant figures will be reported. If a datum contains more than three figures, it will be rounded off to three figures.

#### (4) Reporting Levels

The reporting units, smallest increments for reporting, and typical minimum detectable levels for each isotope are shown in Table 1. Reporting increments are sometimes considerably smaller than minimum detectable amounts to avoid truncation errors in averaging.

#### (5) 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 <sup>3</sup>	0.01 pCi/m <sup>3</sup>	0.01 pCi/m <sup>3</sup>
	Water	pCi/l	1 pCi/l	1 pCi/l
	Precipitation	nCi/m <sup>2</sup>	0.01 nCi/m <sup>2</sup>	0.01 nCi/m <sup>2</sup>
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 <sup>3</sup>	0.1 pCi/m <sup>3</sup>	2 pCi/m <sup>3</sup>
†† Plutonium-238,239,240	Air	aCi/m <sup>3</sup>	0.1 aCi/m <sup>3</sup>	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 <sup>3</sup>	0.1 aCi/m <sup>3</sup>	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
	(specific radiochemical analysis)			
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<sup>3</sup> would be dependent on precipitation (mm).

†† This value of MDL for air in terms of pCi/m<sup>3</sup> would be dependent on the air volume. Measurement by alpha spectroscopy which 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<sup>3</sup> would be dependent on the air volume. MDL for all media given per sample.

‡‡ Activity as of the day of counting.

ENVIRONMENTAL RADIATION  
AMBIENT MONITORING SYSTEM (ERAMS)

Section I. 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 <sup>†</sup> 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 EERF 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 those field stations collecting air filters. These samples are also sent to EERF where they are composited monthly for gamma scans, tritium, and gross beta activity measurements. Plutonium-238, -239, -240, and uranium-234, -235, and -238 analyses are performed on samples which exceed 2 pCi/liter gross alpha.

A compilation of individual measurements is available from the EPA, EERF, Montgomery, AL 36109.

Tables 2-4 contain the data in airborne particulate samples for July - September 1987.

Tables 5-7 contain the data in precipitation sample for July - September 1987.

Table 8 contains the data for tritium in precipitation samples for July - September 1987 at the selected sites.

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



**Table 2**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**July 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
AL: ASHFORD	5	0.0	0.0	0.0	0.02	0.00	0.01
AL: MONTGOMERY	6	2.2	1.0	1.4	0.27	0.02	0.12
AR: LITTLE ROCK	8	0.9	0.0	0.4	0.07	0.01	0.02
AZ: PHOENIX	8	1.1	0.0	0.5	0.07	0.01	0.03
CA: BERKELEY	9	0.0	0.0	0.0	0.00	0.00	0.00
CA: LOS ANGELES	9	0.2	0.0	0.1	0.01	0.00	0.01
CO: DENVER	9	0.9	0.4	0.7	0.01	0.00	0.01
CT: HARTFORD	9	0.2	0.1	0.1	0.02	0.00	0.01
DE: WILMINGTON	9	0.4	0.0	0.3	0.02	0.01	0.01
FL: JACKSONVILLE	7	0.2	0.0	0.1	0.02	0.01	0.01
FL: MIAMI	9	0.1	0.0	0.0	0.01	0.01	0.01
GA: ATLANTA	5	0.5	0.2	0.3	0.02	0.01	0.01
HI: HONOLULU	9	0.4	0.2	0.3	0.00	0.00	0.00
IA: IOWA CITY	9	0.8	0.1	0.5	0.03	0.00	0.02
ID: BOISE	9	0.2	0.1	0.1	0.01	0.01	0.01
ID: IDAHO FALLS	9	0.0	0.0	0.0	0.01	0.00	0.01
IL: CHICAGO	9	0.9	0.1	0.4	0.06	0.01	0.02
IN: INDIANAPOLIS	7	0.9	0.1	0.3	0.03	0.01	0.02
KS: TOPEKA	9	2.0	0.4	1.3	0.03	0.01	0.02
KY: FRANKFORT	7	3.0	0.1	1.3	0.04	0.01	0.02
LA: NEW ORLEANS	4	0.1	0.0	0.1	0.02	0.01	0.01
MA: LAWRENCE	9	0.3	0.0	0.2	0.02	0.01	0.01
ME: AUGUSTA	9	0.3	0.0	0.2	0.01	0.00	0.01
MI: LANSING	9	0.4	0.2	0.3	0.03	0.00	0.01
MN: MINNEAPOLIS	9	0.3	0.0	0.2	0.02	0.01	0.01
MO: JEFFERSON CITY	8	1.3	0.1	0.6	0.08	0.00	0.02
MS: JACKSON	9	0.5	0.1	0.3	0.02	0.01	0.01
NC: CHARLOTTE	9	0.7	0.1	0.3	0.03	0.01	0.01
NC: WILMINGTON	9	0.0	0.0	0.0	0.01	0.01	0.01
ND: BISMARCK	9	1.0	0.2	0.7	0.02	0.01	0.01
NE: LINCOLN	8	2.6	0.3	1.5	0.04	0.01	0.02
NH: CONCORD	9	0.2	0.1	0.2	0.01	0.00	0.01
NJ: TRENTON	9	1.0	0.2	0.5	0.01	0.01	0.01
NM: SANTA FE	8	0.4	0.3	0.3	0.01	0.00	0.01
NV: LAS VEGAS	9	0.3	0.1	0.2	0.03	0.01	0.01
NY: ALBANY	4	0.1	0.0	0.1	0.01	0.01	0.01
NY: NEW YORK CITY	9	0.3	0.1	0.2	0.02	0.01	0.01

**Table 2 (continued)**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**July 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
NY:NIAGARA FALLS	9	0.4	0.1	0.3	0.03	0.01	0.02
NY:SYRACUSE	3	0.4	0.1	0.3	0.02	0.01	0.01
NY:YAPHANK	8	0.2	0.1	0.2	0.01	0.00	0.01
OH:COLUMBUS	8	0.4	0.0	0.2	0.02	0.01	0.01
OH:PAINESVILLE	9	0.6	0.1	0.2	0.03	0.00	0.01
OH:TOLEDO	9	0.6	0.0	0.2	0.02	0.00	0.01
OK:OKLAHOMA CITY	8	0.8	0.2	0.5	0.03	0.01	0.02
OR:PORTLAND	9	0.0	0.0	0.0	0.01	0.00	0.00
PA:GOLDSBORO	9	1.2	0.0	0.6	0.03	0.01	0.02
PA:HARRISBURG	9	0.7	0.1	0.3	0.02	0.01	0.01
PA:PHILADELPHIA	9	0.3	0.1	0.2	0.02	0.01	0.01
PA:PITTSBURGH	9	0.4	0.1	0.3	0.02	0.01	0.01
PA:THREE MILE ISLAND	9	1.3	0.2	0.8	0.03	0.01	0.02
RI:PROVIDENCE	7	0.5	0.0	0.2	0.02	0.00	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:COLUMBIA	8	0.7	0.1	0.4	0.03	0.01	0.02
SD:PIERRE	7	0.4	0.2	0.3	0.01	0.01	0.01
TN:KNOXVILLE	6	0.8	0.1	0.3	0.03	0.01	0.01
TN:NASHVILLE	9	1.5	0.1	0.5	0.06	0.01	0.02
TX:AUSTIN	9	0.3	0.1	0.2	0.02	0.01	0.01
TX:EL PASO	9	1.0	0.2	0.5	0.02	0.00	0.01
VA:LYNCHBURG	9	1.1	0.4	0.7	0.02	0.01	0.01
WA:OLYMPIA	9	0.2	0.0	0.1	0.00	0.00	0.00
WA:SPOKANE	9	0.5	0.1	0.2	0.01	0.00	0.01
WI:MADISON	9	1.0	0.2	0.5	0.02	0.01	0.01
WV:CHARLESTON	8	0.7	0.1	0.4	0.02	0.01	0.01

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

Minimum Detectable Limit for lab measurement - 0.01 pCi/m<sup>3</sup>.

**Table 3**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**August 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
AL:ASHFORD	4	0.0	0.0	0.0	0.02	0.01	0.01
AL:MONTGOMERY	8	3.2	0.4	1.1	0.04	0.01	0.02
AR:LITTLE ROCK	9	0.9	0.3	0.5	0.03	0.01	0.02
AZ:PHOENIX	7	2.5	0.0	0.8	0.06	0.01	0.03
CA:BERKELEY	8	0.0	0.0	0.0	0.01	0.00	0.00
CA:LOS ANGELES	8	0.3	0.0	0.1	0.02	0.01	0.01
CO:DENVER	9	1.1	0.4	0.6	0.02	0.01	0.01
CT:HARTFORD	9	0.2	0.0	0.1	0.01	0.00	0.01
DE:WILMINGTON	8	0.3	0.0	0.2	0.01	0.01	0.01
FL:JACKSONVILLE	9	0.1	0.1	0.1	0.02	0.01	0.01
FL:MIAMI	9	0.1	0.0	0.0	0.02	0.01	0.01
GA:ATLANTA	5	0.4	0.2	0.3	0.02	0.01	0.02
HI:HONOLULU	9	0.3	0.1	0.2	0.01	0.00	0.00
IA:IOWA CITY	9	1.0	0.0	0.4	0.02	0.01	0.01
ID:BOISE	8	0.2	0.1	0.2	0.01	0.01	0.01
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.01	0.01	0.01
IL:CHICAGO	8	0.2	0.1	0.2	0.01	0.01	0.01
IN:INDIANAPOLIS	7	0.6	0.2	0.4	0.02	0.01	0.01
KS:TOPEKA	9	7.4	0.8	1.8	0.02	0.01	0.01
KY:FRANKFORT	7	1.5	0.5	0.9	0.02	0.02	0.02
LA:NEW ORLEANS	3	0.1	0.0	0.1	0.02	0.01	0.02
MA:LAWRENCE	8	0.2	0.0	0.1	0.01	0.00	0.01
ME:AUGUSTA	8	0.4	0.0	0.2	0.01	0.00	0.00
MI:LANSING	9	0.6	0.1	0.2	0.02	0.01	0.01
MN:MINNEAPOLIS	8	0.5	0.1	0.2	0.02	0.01	0.01
MO:JEFFERSON CITY	8	0.8	0.3	0.5	0.02	0.01	0.02
MS:JACKSON	7	0.6	0.1	0.3	0.04	0.01	0.02
NC:CHARLOTTE	8	0.7	0.1	0.4	0.05	0.01	0.02
NC:WILMINGTON	9	0.0	0.0	0.0	0.01	0.00	0.01
ND:BISMARCK	8	1.6	0.3	0.8	0.03	0.01	0.02
NE:LINCOLN	9	2.1	0.5	1.3	0.08	0.01	0.02
NH:CONCORD	8	0.3	0.1	0.2	0.01	0.00	0.00
NJ:TRENTON	9	0.9	0.1	0.4	0.01	0.00	0.01
NM:SANTA FE	6	0.3	0.1	0.2	0.01	0.00	0.01
NV:LAS VEGAS	9	0.3	0.2	0.2	0.03	0.00	0.01
NY:ALBANY	4	0.1	0.0	0.1	0.01	0.01	0.01
NY:NEW YORK CITY	9	0.3	0.1	0.2	0.01	0.00	0.01

**Table 3 (continued)**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**August 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
NY:NIAGARA FALLS	8	0.3	0.1	0.2	0.03	0.01	0.01
NY:SYRACUSE	4	0.2	0.1	0.1	0.01	0.01	0.01
NY:YAPHANK	6	0.3	0.0	0.2	0.01	0.01	0.01
OH:COLUMBUS	8	0.4	0.1	0.2	0.02	0.01	0.02
OH:PAINESVILLE	8	0.4	0.1	0.2	0.02	0.01	0.01
OH:TOLEDO	9	0.4	0.1	0.2	0.02	0.01	0.01
OK:OKLAHOMA CITY	7	0.8	0.2	0.6	0.02	0.01	0.02
OR:PORTLAND	8	0.0	0.0	0.0	0.01	0.00	0.00
PA:GOLDSBORO	9	0.9	0.0	0.5	0.02	0.01	0.01
PA:HARRISBURG	9	0.6	0.1	0.3	0.01	0.01	0.01
PA:PHILADELPHIA	8	0.3	0.1	0.2	0.01	0.01	0.01
PA:PITTSBURGH	9	0.2	0.2	0.2	0.02	0.01	0.01
PA:THREE MILE ISLAND	9	1.3	0.2	0.7	0.03	0.01	0.01
RI:PROVIDENCE	9	0.3	0.1	0.1	0.01	0.00	0.01
SC:BARNWELL	1	0.0	0.0	0.0	0.00	0.00	0.00
SC:COLUMBIA	8	0.8	0.0	0.3	0.03	0.01	0.02
SD:PIERRE	5	0.6	0.0	0.3	0.01	0.01	0.01
TN:KNOXVILLE	9	0.7	0.1	0.4	0.03	0.01	0.01
TN:NASHVILLE	8	0.6	0.3	0.4	0.03	0.01	0.02
TX:AUSTIN	8	0.4	0.2	0.3	0.02	0.01	0.02
TX:EL PASO	9	0.6	0.1	0.4	0.02	0.01	0.01
VA:LYNCHBURG	9	1.1	0.3	0.8	0.02	0.01	0.01
WA:OLYMPIA	9	0.3	0.1	0.1	0.01	0.00	0.00
WA:SPOKANE	9	0.4	0.2	0.3	0.02	0.00	0.01
WI:MADISON	9	0.6	0.2	0.4	0.02	0.01	0.01
WV:CHARLESTON	6	0.4	0.2	0.3	0.02	0.01	0.02

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

Minimum Detectable Limit for lab measurement - 0.01 pCi/m<sup>3</sup>.

**Table 4**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**September 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
		(pCi/m <sup>3</sup> )			(pCi/m <sup>3</sup> )		
AL:ASHFORD	1	0.0	0.0	0.0	0.00	0.00	0.00
AL:MONTGOMERY	9	2.8	0.7	1.4	0.22	0.01	0.06
AR:LITTLE ROCK	7	0.8	0.1	0.4	0.03	0.01	0.02
AZ:PHOENIX	2	2.0	0.3	1.1	0.03	0.02	0.03
CA:BERKELEY	9	0.0	0.0	0.0	0.01	0.01	0.01
CA:LOS ANGELES	9	0.3	0.2	0.2	0.04	0.01	0.02
CO:DENVER	8	2.5	0.6	1.0	0.03	0.01	0.01
CT:HARTFORD	8	0.2	0.0	0.1	0.01	0.00	0.00
DE:WILMINGTON	9	0.4	0.0	0.2	0.01	0.00	0.01
FL:JACKSONVILLE	8	0.1	0.0	0.1	0.02	0.00	0.01
FL:MIAMI	8	0.1	0.0	0.1	0.01	0.00	0.01
GA:ATLANTA	3	0.3	0.1	0.2	0.02	0.02	0.02
HI:HONOLULU	8	0.3	0.1	0.2	0.00	0.00	0.00
IA:IOWA CITY	8	0.8	0.2	0.4	0.02	0.01	0.01
ID:BOISE	8	0.5	0.1	0.3	0.03	0.01	0.01
ID:IDAHO FALLS	8	0.0	0.0	0.0	0.02	0.01	0.01
IL:CHICAGO	8	0.5	0.1	0.2	0.02	0.01	0.01
IN:INDIANAPOLIS	9	0.6	0.3	0.4	0.03	0.01	0.02
KS:TOPEKA	8	2.3	0.9	1.4	0.06	0.01	0.02
KY:FRANKFORT	5	1.2	0.5	0.8	0.05	0.01	0.02
LA:NEW ORLEANS	4	0.1	0.1	0.1	0.03	0.01	0.02
MA:LAWRENCE	9	0.3	0.1	0.1	0.01	0.00	0.01
ME:AUGUSTA	8	0.3	0.0	0.2	0.01	0.00	0.00
MI:LANSING	8	0.3	0.0	0.2	0.03	0.01	0.01
MN:MINNEAPOLIS	9	2.7	0.0	0.5	0.02	0.00	0.01
MO:JEFFERSON CITY	9	1.4	0.4	0.8	0.09	0.01	0.03
MS:JACKSON	8	0.8	0.3	0.4	0.05	0.01	0.03
NC:CHARLOTTE	9	0.7	0.1	0.3	0.05	0.00	0.02
NC:WILMINGTON	6	0.0	0.0	0.0	0.01	0.00	0.01
ND:BISMARCK	9	1.4	0.6	0.9	0.02	0.01	0.01
NE:LINCOLN	8	3.8	0.3	1.4	0.06	0.01	0.02
NH:CONCORD	9	0.3	0.0	0.1	0.01	0.00	0.01
NJ:TRENTON	8	1.0	0.2	0.5	0.01	0.01	0.01
NM:SANTA FE	4	0.5	0.1	0.3	0.02	0.01	0.01
NV:LAS VEGAS	8	0.3	0.1	0.3	0.07	0.01	0.03
NY:ALBANY	5	0.2	0.0	0.1	0.01	0.01	0.01
NY:NEW YORK CITY	7	0.5	0.1	0.3	0.02	0.00	0.01

**Table 4 (continued)**  
**Airborne Particulates**  
**Gross Beta Concentrations**  
**September 1987**

Location	# Sam	5--Hr Field Estimate			EERF Lab Measurement		
		Max	Min	Ave	Max	Min	Ave
NY:NIAGARA FALLS	9	0.3	0.1	0.2	0.02	0.01	0.01
NY:SYRACUSE	1	0.1	0.1	0.1	0.01	0.01	0.01
NY:YAPHANK	7	0.7	0.0	0.2	0.01	0.00	0.01
OH:COLUMBUS	9	0.3	0.1	0.2	0.06	0.01	0.02
OH:PAINESVILLE	9	0.2	0.1	0.2	0.02	0.01	0.01
OH:TOLEDO	8	0.7	0.1	0.3	0.09	0.01	0.02
OK:OKLAHOMA CITY	8	1.5	0.2	0.5	0.04	0.01	0.02
OR:PORTLAND	8	0.0	0.0	0.0	0.01	0.00	0.01
PA:GOLDSBORO	8	0.9	0.1	0.3	0.02	0.01	0.01
PA:HARRISBURG	8	0.5	0.1	0.2	0.02	0.01	0.01
PA:PHILADELPHIA	9	0.3	0.1	0.2	0.02	0.00	0.01
PA:PITTSBURGH	8	0.0	0.0	0.0	0.02	0.01	0.01
PA:THREE MILE ISLAND	8	1.2	0.1	0.5	0.03	0.01	0.01
RI:PROVIDENCE	7	0.2	0.1	0.1	0.02	0.00	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.02	0.01	0.01
SC:COLUMBIA	8	0.8	0.1	0.3	0.05	0.01	0.03
SD:PIERRE	6	3.0	0.3	1.0	0.02	0.01	0.01
TN:KNOXVILLE	7	0.7	0.1	0.4	0.02	0.01	0.02
TN:NASHVILLE	9	1.1	0.3	0.6	0.03	0.01	0.02
TX:AUSTIN	9	0.4	0.1	0.3	0.02	0.00	0.01
TX:EL PASO	8	1.1	0.2	0.7	0.04	0.02	0.03
VA:LYNCHBURG	8	1.1	0.1	0.7	0.02	0.00	0.01
WA:OLYMPIA	8	0.3	0.1	0.2	0.01	0.00	0.01
WA:SPOKANE	8	0.9	0.3	0.5	0.03	0.00	0.02
WI:MADISON	7	0.8	0.0	0.3	0.02	0.01	0.01
WV:CHARLESTON	5	0.0	0.0	0.0	0.03	0.01	0.02

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

Minimum Detectable Limit for lab measurement - 0.01 pCi/m<sup>3</sup>.

**Table 5**  
**Gross Beta Concentrations**  
**in Precipitation**

July 1987

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
AL:MONTGOMERY	51.6	0.07 0.02	ND
AR:LITTLE ROCK	80.0	0.06 0.03	ND
AZ:PHOENIX	7.0	0.89 0.03	ND
CO:DENVER	14.6	0.04 0.01	ND
CT:HARTFORD	20.0	0.08 0.01	ND
DE:WILMINGTON	84.0	0.34 0.06	ND
FL:JACKSONVILLE	68.2	0.10 0.03	ND
FL:MIAMI	41.0	0.04 0.02	ND
ID:IDAHO FALLS	34.6	0.08 0.02	ND
IL:CHICAGO	59.0	0.06 0.03	ND
LA:NEW ORLEANS	71.0	0.08 0.03	ND
MA:LAWRENCE	22.0	0.12 0.02	ND
ME:AUGUSTA	42.0	0.29 0.04	ND
MI:LANSING	83.8	0.05 0.03	ND
MN:MINNEAPOLIS	162.6	0.11 0.07	ND
MO:JEFFERSON CITY	24.0	0.03 0.01	ND
NC:CHARLOTTE	42.0	0.17 0.03	ND
NC:WILMINGTON	73.0	0.18 0.05	ND
ND:BISMARCK	100.6	0.18 0.05	ND
NH:CONCORD	83.2	0.35 0.06	ND
NJ:TRENTON	132.0	0.49 0.09	ND
NM:SANTA FE	27.0	0.04 0.01	ND
NV:LAS VEGAS	4.6	0.02 0.01	ND
NY:ALBANY	50.0	0.08 0.03	ND
NY:NEW YORK CITY	41.0	0.08 0.03	ND
NY:NIAGARA FALLS	86.8	0.08 0.05	ND
NY:SYRACUSE	56.0	0.13 0.03	ND
NY:YAPHANK	2.0	0.01 0.01	ND
OH:COLUMBUS	40.0	0.04 0.02	ND
OH:PAINESVILLE	86.0	0.11 0.04	ND

**Table 5 (continued)**  
**Gross Beta Concentrations**  
**in Precipitation**  
**July 1987**

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
OH:TOLEDO	56.0	0.07 0.03	ND
OK:OKLAHOMA CITY	54.0	0.06 0.03	ND
PA:HARRISBURG	51.8	0.17 0.03	ND
PA:MIDDLETOWN	22.0	0.04 0.01	ND
PA:PHILADELPHIA	121.6	0.34 0.07	ND
PA:PITTSBURGH	69.0	0.24 0.04	ND
RI:PROVIDENCE	49.0	0.09 0.03	ND
SC:COLUMBIA	86.4	0.17 0.05	ND
SD:PIERRE	30.4	0.05 0.01	ND
TN:KNOXVILLE	42.0	0.02 0.02	ND
TN:NASHVILLE	108.8	0.16 0.05	ND
TX:AUSTIN	8.0	0.02 0.01	ND
TX:EL PASO	8.0	0.01 0.01	ND
VA:LYNCHBURG	102.3	1.20 0.11	ND
WA:OLYMPIA	18.5	0.03 0.01	ND
WI:MADISON	49.8	0.07 0.02	ND

$\sigma$  = Sigma Counting Error.

ND = No Gamma Activity Detectable.



**Table 6**  
**Gross Beta Concentrations**  
**in Precipitation**

August 1987

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
AL:MONTGOMERY	111.0	0.17 0.06	ND
AR:LITTLE ROCK	65.0	0.21 0.04	ND
AZ:PHOENIX	24.0	0.17 0.02	ND
CO:DENVER	44.8	0.06 0.02	ND
CT:HARTFORD	89.0	0.27 0.05	ND
DE:WILMINGTON	31.0	0.20 0.03	ND
FL:JACKSONVILLE	167.4	0.18 0.08	ND
FL:MIAMI	20.0	0.03 0.01	ND
IL:CHICAGO	251.4	0.49 0.14	ND
LA:NEW ORLEANS	42.0	0.03 0.02	ND
MA:LAWRENCE	43.0	0.15 0.03	ND
ME:AUGUSTA	31.0	0.09 0.02	ND
MI:LANSING	150.2	0.94 0.12	ND
MN:MINNEAPOLIS	72.8	0.07 0.03	ND
MO:JEFFERSON CITY	26.0	0.07 0.02	ND
NC:CHARLOTTE	17.0	0.03 0.01	ND
NC:WILMINGTON	65.0	0.20 0.04	ND
ND:BISMARCK	67.4	0.06 0.03	ND
NH:CONCORD	82.0	0.13 0.04	ND
NJ:TRENTON	100.1	0.33 0.06	ND
NM:SANTA FE	22.0	0.02 0.01	ND
NY:ALBANY	32.0	0.10 0.02	ND
NY:NEW YORK CITY	38.0	0.10 0.02	ND
NY:NIAGARA FALLS	95.0	0.01 0.01	ND
NY:SYRACUSE	29.4	0.07 0.02	ND
NY:YAPHANK	38.0	0.07 0.02	ND
OH:COLUMBUS	53.0	0.07 0.03	ND
OH:PAINESVILLE	153.0	0.51 0.10	ND
OH:TOLEDO	130.0	0.13 0.06	ND
OK:OKLAHOMA CITY	78.0	0.08 0.04	ND

Table 6 (continued)  
Gross Beta Concentrations  
in Precipitation

August 1987

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
OR:PORTLAND	10.0	0.01 0.01	ND
PA:HARRISBURG	91.0	0.39 0.06	ND
PA:MIDDLETOWN	66.0	0.30 0.05	ND
PA:PHILADELPHIA	46.0	0.10 0.03	ND
PA:PITTSBURGH	112.2	0.33 0.07	ND
RI:PROVIDENCE	49.0	0.44 0.05	ND
SC:COLUMBIA	37.0	0.07 0.02	ND
TN:KNOXVILLE	42.0	0.05 0.02	ND
TN:NASHVILLE	40.8	0.03 0.02	ND
TX:EL PASO	83.8	0.08 0.04	ND
VA:LYNCHBURG	4.0	0.10 0.01	ND
WA:OLYMPIA	6.8	0.00 0.01	ND
WI:MADISON	183.4	0.21 0.09	ND

$\sigma$  = Sigma Counting Error.

ND = No Gamma Activity Detectable.

**Table 7**  
**Gross Beta Concentrations**  
**in Precipitation**

September 1987

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
AL:MONTGOMERY	42.6	0.21 0.03	ND
AR:LITTLE ROCK	98.0	0.09 0.04	ND
AZ:PHOENIX	13.0	0.04 0.01	ND
CO:DENVER	8.8	0.02 0.01	ND
CT:HARTFORD	104.0	0.10 0.04	ND
DE:WILMINGTON	142.0	0.18 0.07	ND
FL:JACKSONVILLE	90.6	0.05 0.03	ND
FL:MIAMI	164.0	0.10 0.06	ND
IL:CHICAGO	26.0	0.02 0.01	ND
LA:NEW ORLEANS	40.0	0.03 0.02	ND
MA:LAWRENCE	149.0	0.16 0.07	ND
ME:AUGUSTA	42.0	0.02 0.01	ND
MI:LANSING	91.2	0.23 0.05	ND
MN:MINNEAPOLIS	47.6	0.03 0.02	ND
MO:JEFFERSON CITY	32.0	0.01 0.01	ND
NC:CHARLOTTE	101.0	0.12 0.05	ND
NC:WILMINGTON	28.0	0.04 0.01	ND
ND:BISMARCK	2.4	0.01 0.01	ND
NH:CONCORD	127.1	0.12 0.05	ND
NJ:TRENTON	80.8	0.30 0.05	ND
NY:ALBANY	109.0	0.03 0.04	ND
NY:NEW YORK CITY	38.4	0.06 0.02	ND
NY:NIAGARA FALLS	139.0	0.25 0.07	ND
NY:YAPHANK	98.0	0.17 0.05	ND
OH:COLUMBUS	8.0	0.01 0.01	ND
OH:PAINESVILLE	72.0	0.16 0.04	ND
OH:TOLEDO	44.0	0.07 0.02	ND
OK:OKLAHOMA CITY	73.0	0.08 0.03	ND
OR:PORTLAND	5.0	0.01 0.01	ND
PA:HARRISBURG	173.4	0.33 0.09	ND

**Table 7 (continued)**  
**Gross Beta Concentrations**  
**in Precipitation**  
**September 1987**

Location	Depth (mm)	Act. $\pm 2\sigma$ (nCi/m <sup>2</sup> )	Specific Gamma Activity
PA:MIDDLETOWN	126.0	0.26 0.06	ND
PA:PHILADELPHIA	41.0	0.09 0.02	ND
PA:PITTSBURGH	82.0	0.14 0.04	ND
RI:PROVIDENCE	76.0	0.16 0.04	ND
SC:COLUMBIA	112.4	0.17 0.05	ND
SD:PIERRE	56.0	0.08 0.03	ND
TN:KNOXVILLE	59.6	0.07 0.03	ND
TN:NASHVILLE	40.8	0.03 0.02	ND
TX:AUSTIN	59.0	0.06 0.03	ND
TX:EL PASO	96.0	0.07 0.04	ND
VA:LYNCHBURG	188.0	0.40 0.11	ND
WA:OLYMPIA	11.0	0.01 0.01	ND
WI:MADISON	91.0	0.01 0.03	ND
WV:CHARLESTON	12.6	0.01 0.01	ND

$\sigma$  = Sigma Counting Error.

ND = No Gamma Activity Detectable.

**Table 8**  
**Precipitation**  
**Tritium Concentrations**  
**July - September 1987**

Location	July 1987		August 1987		September 1987	
	nCi/l	$\pm 2\sigma$	nCi/l	$\pm 2\sigma$	nCi/l	$\pm 2\sigma$
AL:MONTGOMERY	0.1	0.2	0.2	0.2	0.2	0.2
AR:LITTLE ROCK	0.2	0.2	0.2	0.2	0.2	0.2
AZ:PHOENIX	0.2	0.2	0.1	0.2	0.1	0.2
CO:DENVER	0.2	0.2	0.4	0.2	0.2	0.2
CT:HARTFORD	0.2	0.2	0.1	0.2	0.2	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	0.2	0.2	0.1	0.2
ID:IDAHO FALLS	0.2	0.2	NS		NS	
IL:CHICAGO	0.2	0.2	0.3	0.2	0.2	0.2
LA:NEW ORLEANS	0.2	0.2	0.2	0.2	0.1	0.2
MA:LAWRENCE	0.1	0.2	0.2	0.2	0.2	0.2
ME:AUGUSTA	0.1	0.2	0.1	0.2	0.3	0.2
MI:LANSING	0.1	0.2	0.2	0.2	0.2	0.2
MN:MINNEAPOLIS	0.2	0.2	0.2	0.2	0.3	0.2
MO:JEFFERSON CITY	0.2	0.2	0.1	0.2	0.3	0.2
NC:CHARLOTTE	0.3	0.2	0.2	0.2	0.4	0.2
NC:WILMINGTON	0.3	0.2	0.2	0.2	0.1	0.2
ND:BISMARCK	0.2	0.2	0.3	0.2	0.4	0.2
NH:CONCORD	0.1	0.2	0.2	0.2	0.2	0.2
NJ:TRENTON	0.1	0.2	0.2	0.2	0.2	0.2
NM:SANTA FE	0.2	0.2	0.2	0.2	NS	
NV:LAS VEGAS	0.1	0.2	NS		NS	
NY:ALBANY	0.1	0.2	0.3	0.2	0.1	0.2
NY:NEW YORK CITY	0.2	0.2	0.2	0.2	0.2	0.2
NY:NIAGARA FALLS	0.3	0.2	0.1	0.2	0.1	0.2
NY:SYRACUSE	0.2	0.2	0.2	0.2	NS	
NY:YAPHANK	0.2	0.2	0.2	0.2	0.1	0.2
OH:COLUMBUS	0.1	0.2	0.1	0.2	0.1	0.2
OH:PAINESVILLE	0.2	0.2	0.1	0.2	0.2	0.2
OH:TOLEDO	0.2	0.2	0.1	0.2	0.2	0.2
OK:OKLAHOMA CITY	0.1	0.2	0.2	0.2	0.1	0.2
OR:PORTLAND	NS		0.1	0.2	0.1	0.2
PA:HARRISBURG	0.1	0.2	0.2	0.2	0.1	0.2
PA:MIDDLETOWN	0.2	0.2	0.1	0.2	0.2	0.2
PA:PHILADELPHIA	0.2	0.2	0.2	0.2	0.1	0.2
PA:PITTSBURGH	0.1	0.2	0.3	0.2	0.3	0.2

**Table 8 (continued)**  
**Precipitation**  
**Tritium Concentrations**  
**July - September 1987**

Location	July 1987		August 1987		September 1987	
	nCi/l	$\pm 2\sigma$	nCi/l	$\pm 2\sigma$	nCi/l	$\pm 2\sigma$
RI:PROVIDENCE	0.1	0.2	0.1	0.2	0.2	0.2
SC:COLUMBIA	0.5	0.2	0.4	0.2	0.2	0.2
SD:PIERRE	0.2	0.2	NS		0.2	0.2
TN:KNOXVILLE	0.1	0.2	0.3	0.2	0.2	0.2
TN:NASHVILLE	0.2	0.2	0.3	0.2	0.1	0.2
TX:AUSTIN	0.2	0.2	NS		0.1	0.2
TX:EL PASO	0.2	0.2	0.1	0.2	0.2	0.2
VA:LYNCHBURG	0.2	0.2	0.3	0.2	0.1	0.2
WA:OLYMPIA	0.2	0.2	0.2	0.2	0.1	0.2
WI:MADISON	0.3	0.2	0.2	0.2	0.2	0.2
WV:CHARLESTON	NS		NS		0.2	0.2

$\sigma$  = Sigma Counting Error.

NS = No Sample.

### Plutonium and Uranium in Airborne Particulates

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

Concentration of the specific isotopes of plutonium-238, -239, -240, and uranium-234, -235, and -238 are determined by alpha spectroscopy following chemical separation. The volume of air represented by the semi-annual composite ranges from 25,000 to 40,000 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 1987.

**Table 9**  
**Plutonium and Uranium In Airborne Particulates**  
**January - June 1987 Composites**

Location	<sup>238</sup> Pu		<sup>239-240</sup> Pu		<sup>234</sup> U		<sup>235</sup> U		<sup>238</sup> U	
	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ
AL: ASHFORD	0.1	0.2	0.3	0.2	17.3	2.4	0.5	0.3	17.2	2.3
AL: MONTGOMERY	0.2	0.4	0.7	0.4	10.8	1.6	0.3	0.2	10.6	1.6
AR: LITTLE ROCK	0.5	0.8	0.8	0.5	22.6	4.0	1.4	0.8	25.7	4.3
AZ: TEMPE	1.4	2.1	0.8	1.1	59.4	10.0	0.7	1.0	55.0	9.4
CA: BERKELEY	0.4	0.4	0.2	0.4	8.7	1.7	0.4	0.4	7.3	1.5
CA: LOS ANGELES	0.6	0.9	0.1	0.5	30.0	4.9	1.4	0.9	24.9	4.4
CO: DENVER	1.3	1.0	0.6	0.6	36.2	5.5	1.0	0.7	31.4	5.0
CT: HARTFORD	0.6	0.7	0.6	0.6	18.1	2.1	0.6	0.3	16.8	2.0
DE: WILMINGTON	0.4	0.5	0.1	0.2	10.6	1.1	0.3	0.1	10.4	1.0
FL: JACKSONVILLE	0.4	0.3	0.7	0.4	10.4	1.6	0.3	0.2	11.7	1.8
FL: MIAMI	1.2	0.8	0.0	0.5	16.6	3.2	0.6	0.5	16.1	3.1
GA: ATLANTA	0.8	0.8	0.4	0.8	27.2	4.2	0.6	0.6	27.0	4.1
HI: HONOLULU	0.5	0.4	0.0	0.1	5.2	1.3	0.4	0.3	6.0	1.3
IA: IOWA CITY	0.5	0.5	0.2	0.4	33.3	5.8	2.8	1.3	27.6	5.1
ID: BOISE	0.5	0.6	0.1	0.4	36.7	4.9	0.8	0.6	42.2	5.4
ID: IDAHO FALLS	0.6	0.8	0.6	0.5	26.0	4.2	1.4	0.9	24.3	4.1
IL: CHICAGO	1.3	0.9	0.3	0.5	22.7	3.4	1.8	0.8	17.3	2.8
IN: INDIANAPOLIS	1.7	1.3	0.4	0.4	44.3	6.6	2.1	1.1	45.1	6.7
KS: TOPEKA	0.6	0.5	0.3	0.4	33.1	5.6	0.0	0.0	26.8	4.8
KY: FRANKFORT	0.4	0.4	0.4	0.3	24.0	3.6	0.8	0.5	20.3	3.1
LA: NEW ORLEANS	0.0	0.6	0.2	0.3	13.9	1.5	0.5	0.2	12.2	1.4
MA: LAWRENCE	0.0	0.6	1.3	1.0	24.8	2.7	1.2	0.4	22.2	2.5
ME: AUGUSTA	-0.3	0.8	0.1	0.4	24.5	2.8	0.8	0.4	24.9	2.8
MI: LANSING	0.9	0.6	0.2	0.3	18.7	3.3	0.8	0.6	18.7	3.3
MN: MINNEAPOLIS	1.9	0.9	0.5	0.5	30.5	5.2	1.8	1.0	26.4	4.7
MO: JEFFERSON CITY	0.5	0.6	0.3	0.3	23.9	4.4	1.2	0.8	23.2	4.3
MS: JACKSON	0.2	0.4	0.0	0.3	15.1	2.7	1.1	0.7	15.5	2.8
NC: CHARLOTTE	0.3	0.3	0.1	0.1	17.2	3.8	0.6	0.8	16.6	3.6
NC: WILMINGTON	0.4	0.3	0.5	0.3	14.1	2.4	0.7	0.5	13.5	2.3
ND: BISMARCK	1.1	1.3	0.8	0.7	35.3	6.1	1.5	1.0	31.4	5.7
NE: LINCOLN	1.4	1.3	0.8	0.8	27.4	3.4	1.4	0.6	28.6	3.4
NH: CONCORD	0.1	0.2	0.1	0.1	10.9	1.2	0.4	0.2	10.3	1.2
NJ: TRENTON	0.2	0.3	0.0	0.1	12.8	1.4	0.3	0.2	11.5	1.2
NM: SANTA FE	1.2	0.8	0.6	0.6	27.0	5.0	1.4	1.0	26.4	4.9
NV: LAS VEGAS	1.5	2.3	2.6	2.1	106.5	14.0	5.0	2.4	54.5	9.1
NY: ALBANY	0.3	0.8	0.1	0.2	38.4	4.5	1.7	0.7	38.8	4.3
NY: NEW YORK CITY	1.2	1.2	0.3	0.5	19.1	2.2	0.9	0.4	17.5	2.1



Table 9 (continued)

## Plutonium and Uranium In Airborne Particulates

January - June 1987 Composites

Location	<sup>238</sup> Pu		<sup>238-240</sup> Pu		<sup>234</sup> U		<sup>235</sup> U		<sup>238</sup> U	
	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ	aCi/m <sup>3</sup>	±2σ
NY:NIAGARA FALLS	0.4	0.5	0.1	0.4	39.8	3.7	1.7	0.5	43.7	4.0
NY:SYRACUSE	1.1	1.3	0.7	0.6	21.1	2.5	0.3	0.3	24.3	2.7
NY:YAPHANK	0.1	0.2	0.4	0.3	11.0	2.1	0.3	0.3	10.6	2.0
OH:COLUMBUS	1.9	1.1	0.9	0.6	28.1	4.5	1.2	0.8	25.0	4.1
OH:PAINESVILLE	1.0	0.7	0.2	0.4	30.5	5.0	0.4	0.4	28.6	4.8
OH:TOLEDO	0.7	0.5	0.5	0.5	27.7	4.1	1.3	0.7	31.2	4.5
OK:OKLAHOMA CITY	0.8	0.8	0.3	0.6	21.3	2.7	0.9	0.4	19.9	2.5
OR:PORTLAND	0.1	0.7	1.7	0.9	15.5	3.4	0.5	0.8	13.1	3.1
PA:GOLDSBORO	0.2	0.3	0.2	0.1	15.6	2.2	0.6	0.4	14.6	2.1
PA:HARRISBURG	0.1	0.4	0.1	0.5	16.3	1.7	1.0	0.5	15.3	1.6
PA:PHILADELPHIA	0.0	0.4	0.2	0.3	19.9	4.0	1.5	0.9	24.5	4.4
PA:PITTSBURGH	-0.4	0.6	0.4	0.5	25.9	2.6	0.9	0.3	22.4	2.3
PA:THREE MILE ISLAND	0.6	0.6	0.1	0.2	14.8	1.6	1.2	0.5	15.4	1.7
RI:PROVIDENCE	0.2	0.6	0.2	0.7	25.7	3.0	1.9	0.6	26.8	3.1
SC:BARNWELL	0.1	0.5	0.8	0.4	19.5	2.3	0.8	0.4	19.9	2.3
SC:COLUMBIA	0.3	0.5	0.2	0.3	30.7	4.5	1.6	0.8	29.1	4.4
SD:PIERRE	0.4	0.7	0.1	0.3	24.3	5.0	0.4	0.5	20.7	4.5
TN:KNOXVILLE	0.1	0.2	0.1	0.3	12.9	1.9	0.8	0.4	11.9	1.8
TN:NASHVILLE	0.2	0.4	0.2	0.3	23.5	3.6	0.9	0.5	26.2	3.9
TX:AUSTIN	1.0	1.1	1.0	0.7	16.3	3.3	0.3	0.5	16.7	3.4
TX:EL PASO	2.4	1.7	0.5	1.0	71.6	12.8	5.2	2.8	64.5	11.9
VA:LYNCHBURG	0.0	0.2	0.2	0.2	312.4	31.8	6.2	1.3	18.8	2.7
WA:OLYMPIA	1.0	0.5	0.2	0.3	5.4	1.1	0.2	0.2	3.9	0.9
WA:SPOKANE	0.6	1.0	3.5	2.0	28.7	6.3	1.4	1.2	24.3	5.7
WI:MADISON	1.2	1.1	0.4	0.8	14.6	3.6	0.5	0.9	15.4	3.6
WV:CHARLESTON	0.3	0.5	0.1	0.1	28.9	4.7	0.0	0.0	27.6	4.5
WY:CHEYENNE	0.1	0.3	0.2	0.3	12.2	1.9	0.5	0.3	10.3	1.7

σ = Sigma Counting Error.

NA = No Analysis.

## 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. Monitoring of krypton-85 in the atmosphere has been conducted 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 EERF 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.

ENVIRONMENTAL RADIATION  
AMBIENT MONITORING SYSTEM (ERAMS)

Section II. 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 10 contains the data for tritium concentrations for July - September 1987.

**Table 10**  
**Surface Water**  
**Tritium Concentrations**  
**July September 1987**

Location	Source	Date Collected	nCi/1	$\pm 2\sigma$
AL:DECATUR	TENNESSEE RIVER	07/09/87	0.4	0.2
AL:GORDON	CHATTAHOOCHEE RIVER	07/14/87	0.3	0.2
AL:SCOTTSBORO	TENNESSEE RIVER	06/30/87	0.3	0.2
AR:LITTLE ROCK	ARKANSAS RIVER	07/10/87	0.2	0.2
CA:CLAY STATION	FOLSOM S. CANAL	07/14/87	0.2	0.2
CA:DIABLO CANYON	PACIFIC OCEAN	07/24/87	0.2	0.2
CA:EUREKA	HUMBOLDT BAY	07/09/87	0.1	0.2
CA:SAN ONOFRE	PACIFIC OCEAN	09/23/87	0.1	0.2
CO:PLATTEVILLE	SOUTH PLATTE RIVER	07/06/87	0.3	0.2
CT:EAST HADDAM	CONNECTICUT RIVER	08/06/87	0.1	0.2
CT:WATERFORD	LONG ISLAND SOUND	08/06/87	0.3	0.2
FL:CRYSTAL RIVER	GULF OF MEXICO	07/06/87	0.1	0.2
FL:FT. PIERCE	ATLANTIC OCEAN	07/01/87	0.1	0.2
FL:HOMESTEAD	BISCAYNE BAY	09/01/87	0.1	0.2
GA:BAXLEY	ALTAMAHA RIVER	07/01/87	0.3	0.2
IA:CEDAR RAPIDS	CEDAR RIVER	07/14/87	0.2	0.2
ID:BUHL	SNAKE RIVER	07/07/87	0.1	0.2
IL:E. MOLINE	MISSISSIPPI RIVER	09/09/87	0.2	0.2
IL:MORRIS	ILLINOIS RIVER	08/21/87	0.1	0.2
IL:ZION	LAKE MICHIGAN	09/30/87	0.1	0.2
KS:LeROY	NEOSHO RIVER	06/30/87	0.2	0.2
LA:NEW ORLEANS	MISSISSIPPI RIVER	07/08/87	0.1	0.2
MA:PLYMOUTH	CAPE COD BAY	07/01/87	0.1	0.2
MD:CONOWINGO	SUSQUEHANNA RIVER	07/28/87	0.2	0.2
MD:LUSBY	CHESAPEAKE BAY	07/07/87	0.1	0.2
ME:WISCASSET	MONTSEWAY BAY	07/09/87	0.2	0.2
MI:BRIDGMAN	LAKE MICHIGAN	07/14/87	0.2	0.2
MI:CHARLEVOIX	LAKE MICHIGAN	07/04/87	0.2	0.2
MI:MONROE	LAKE ERIE	07/06/87	0.2	0.2
MI:SOUTH HAVEN	LAKE MICHIGAN	07/02/87	0.1	0.2
MN:MONTICELLO	MISSISSIPPI RIVER	06/30/87	0.1	0.2
MN:RED WING	MISSISSIPPI RIVER	07/13/87	0.1	0.2
MS:PORT GIBSON	MISSISSIPPI RIVER	07/09/87	0.1	0.2
NC:CHARLOTTE	CATAWBA RIVER	07/13/87	0.6	0.2
NC:SOUTHPORT	ATLANTIC OCEAN	07/31/87	0.2	0.2
NE:RULO	MISSOURI RIVER	07/16/87	0.2	0.2
NJ:BAYSIDE	DELAWARE RIVER	07/21/87	0.2	0.2

**Table 10 (continued)**  
**Surface Water**  
**Tritium Concentrations**  
**July September 1987**

Location	Source	Date Collected	nCi/l	$\pm 2\sigma$
NJ:OYSTER CREEK	OYSTER CREEK	07/16/87	0.2	0.2
NV:BOULDER CITY	COLORADO RIVER	07/29/87	0.2	0.2
NY:CHELSEA	HUDSON RIVER	07/08/87	0.2	0.2
OH:TOLEDO	LAKE ERIE	07/01/87	0.2	0.2
OR:BRADWOOD	COLUMBIA RIVER	07/29/87	0.1	0.2
PA:DANVILLE	SUSQUEHANNA RIVER	07/29/87	0.2	0.2
SC:ALLEDALE	SAVANNAH RIVER	07/01/87	3.1	0.2
SC:BROAD RIVER	BROAD RIVER	07/27/87	0.4	0.2
SC:HARTSVILLE	LAKE ROBINSON	07/06/87	0.5	0.2
TN:BULL RUN	CLINCH RIVER	09/01/87	0.2	0.2
TN:DAISY	TENNESSEE RIVER	08/18/87	0.1	0.2
TN:KINGSTON	CLINCH RIVER	07/01/87	0.6	0.2
TN:OAK RIDGE	CLINCH RIVER	08/21/87	0.3	0.2
TX:EL PASO	RIO GRANDE	08/10/87	0.2	0.2
VA:DOSWELL	NORTH ANNA RIVER	07/09/87	3.1	0.2
VA:NEWPORT NEWS	JAMES RIVER	09/02/87	0.1	0.2
WA:NORTHPORT	COLUMBIA RIVER	07/08/87	0.2	0.2
WA:RICHLAND	COLUMBIA RIVER	08/05/87	0.2	0.2
WI:TWO CREEKS	LAKE MICHIGAN	07/13/87	0.2	0.2
WI:VICTORY	MISSISSIPPI RIVER	07/13/87	0.3	0.2
WV:WHEELING	OHIO RIVER	09/22/87	0.2	0.2

$\sigma$  = 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 11 contains the data for tritium in drinking water for July - September 1987.

Table 12 contains the data on gross alpha, gross beta, strontium-90, and radium-226 in drinking water for January - December 1986.

**Table 11**  
**Drinking Water**  
**Tritium Concentrations**  
**July - September 1987**

Location	Date Collected	nCi/l	$\pm 2\sigma$
AK:FAIRBANKS	07/10/87	0.1	0.2
AL:DOTHAN	07/15/87	0.2	0.2
AL:MONTGOMERY	08/13/87	0.1	0.2
AL:MUSCLE SHOALS	07/07/87	0.3	0.2
AL:SCOTTSBORO	06/30/87	0.2	0.2
AR:LITTLE ROCK	07/10/87	0.1	0.2
CA:BERKELEY	07/07/87	0.1	0.2
CA:LOS ANGELES	07/02/87	0.2	0.2
CO:DENVER	07/06/87	0.2	0.2
CO:PLATTEVILLE	07/06/87	0.2	0.2
CT:HARTFORD	07/01/87	0.2	0.2
DC:WASHINGTON	07/01/87	0.1	0.2
DE:DOVER	07/02/87	0.1	0.2
FL:MIAMI	07/06/87	0.2	0.2
FL:TAMPA	07/06/87	0.1	0.2
GA:BAXLEY	09/22/87	0.2	0.2
GA:SAVANNAH	09/29/87	0.2	0.2
HI:HONOLULU	08/04/87	0.2	0.2
IA:CEDAR RAPIDS	07/14/87	0.2	0.2
ID:BOISE	08/05/87	0.1	0.2
ID:IDAHO FALLS	08/11/87	0.1	0.2
IL:MORRIS	07/13/87	0.2	0.2
IL:W. CHICAGO	07/01/87	0.1	0.2
KS:TOPEKA	07/01/87	0.1	0.2
LA:NEW ORLEANS	07/01/87	0.3	0.2
MA:LAWRENCE	07/13/87	0.1	0.2
MD:BALTIMORE	09/04/87	0.2	0.2
MD:CONOWINGO	07/28/87	0.3	0.2
ME:AUGUSTA	07/07/87	0.2	0.2
MI:DETROIT	07/07/87	0.2	0.2
MI:GRAND RAPIDS	07/06/87	0.3	0.2
MN:MINNEAPOLIS	07/07/87	0.2	0.2
MN:RED WING	07/13/87	0.2	0.2
MO:JEFFERSON CITY	09/02/87	0.2	0.2
MS:JACKSON	07/10/87	0.2	0.2
MS:PORT GIBSON	07/10/87	0.2	0.2
MT:HELENA	07/29/87	0.2	0.2

**Table 11 (continued)**  
**Drinking Water**  
**Tritium Concentrations**  
**July - September 1987**

Location	Date		nCi/l	$\pm 2\sigma$
	Collected			
NC:CHARLOTTE	07/13/87		0.3	0.2
NC:WILMINGTON	07/31/87		0.1	0.2
ND:BISMARCK	07/01/87		0.2	0.2
NE:LINCOLN	08/07/87		0.2	0.2
NH:CONCORD	07/01/87		0.2	0.2
NJ:TRENTON	07/24/87		0.2	0.2
NJ:WARETOWN	07/16/87		0.1	0.2
NM:SANTA FE	07/06/87		0.2	0.2
NV:LAS VEGAS	07/07/87		0.2	0.2
NY:ALBANY	07/06/87		0.2	0.2
NY:NEW YORK CITY	07/07/87		0.2	0.2
NY:NIAGARA FALLS	07/08/87		0.2	0.2
NY:SYRACUSE	09/21/87		0.1	0.2
OH:CINCINNATI	09/30/87		0.2	0.2
OH:COLUMBUS	07/09/87		0.2	0.2
OH:EAST LIVERPOOL	08/05/87		0.1	0.2
OH:PAINESVILLE	07/02/87		0.2	0.2
OH:TOLEDO	07/01/87		0.1	0.2
OK:OKLAHOMA CITY	07/01/87		0.2	0.2
OR:PORTLAND	07/06/87		0.1	0.2
PA:COLUMBIA	07/30/87		0.1	0.2
PA:HARRISBURG	07/29/87		0.3	0.2
PA:PITTSBURGH	08/05/87		0.2	0.2
PC:ANCON	07/09/87		0.1	0.2
RI:PROVIDENCE	07/01/87		0.2	0.2
SC:BARNWELL	07/21/87		0.2	0.2
SC:COLUMBIA	07/02/87		0.2	0.2
SC:HARTSVILLE	08/03/87		0.1	0.2
SC:JENKINSVILLE	07/24/87		0.3	0.2
SC:SENECA	07/21/87		0.2	0.2
TN:CHATTANOOGA	06/30/87		0.3	0.2
TN:KNOXVILLE	06/29/87		0.2	0.2
TX:AUSTIN	07/23/87		0.2	0.2
VA:DOSWELL	07/01/87		0.2	0.2
VA:LYNCHBURG	07/01/87		0.2	0.2
VA:VIRGINIA BEACH	08/13/87		0.1	0.2
VI:ST. THOMAS	08/03/87		0.1	0.2



Table 11 (continued)  
 Drinking Water  
 Tritium Concentrations  
 July - September 1987

Location	Date Collected	nCi/l	$\pm 2\sigma$
WA:RICHLAND	07/22/87	0.2	0.2
WA:SEATTLE	07/01/87	0.1	0.2
WI:GENOA CITY	07/13/87	0.1	0.2
WI:MADISON	07/03/87	0.1	0.2

$\sigma$  = Sigma Counting Error.

**Table 12**  
**Drinking Water**  
**Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations**  
**January - December 1986 Composites**

Location	Total Solids (mg/l)	Gross Beta		Gross Alpha		<sup>90</sup> Sr		<sup>226</sup> Ra		Specific Gamma Activity
		pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	
AK:FAIRBANKS	168.0	3.0	1.5	0.1	0.7	0.0	0.2	NA		ND
AL:DOTHAN	134.3	1.6	1.0	0.1	0.5	0.1	0.1	NA		ND
AL:MONTGOMERY	73.0	1.7	0.9	0.2	0.3	0.3	0.3	NA		ND
AL:MUSCLE SHOALS	98.6	2.7	1.0	0.2	0.4	-0.1	0.2	NA		ND
AL:SCOTTSBORO	152.0	2.1	0.9	1.9	0.8	0.0	0.1	0.1	0.0	ND
AR:LITTLE ROCK	33.8	0.1	0.1	0.1	0.2	0.0	0.1	NA		ND
CA:BERKELEY	38.6	1.5	0.9	0.1	0.3	0.2	0.2	NA		ND
CA:LOS ANGELES	382.7	3.1	2.1	5.1	2.2	0.1	0.1	0.1	0.0	ND
CO:DENVER	121.3	1.2	0.9	1.1	0.7	0.1	0.0	NA		ND
CO:PLATTEVILLE	905.7	6.5	3.7	19.0	6.0	0.1	0.1	0.3	0.0	ND
CT:HARTFORD	43.4	1.3	0.9	0.1	0.2	0.1	0.3	NA		ND
DC:WASHINGTON	225.2	3.0	1.7	0.3	0.7	0.1	0.0	NA		ND
DE:DOVER	204.7	3.5	1.6	0.3	1.0	-0.1	0.0	NA		ND
DE:WILMINGTON	95.6	2.9	1.0	0.1	0.4	0.3	0.1	NA		ND
FL:MIAMI	182.6	0.9	1.1	0.2	0.6	0.0	0.0	NA		ND
FL:TAMPA	203.7	2.9	1.6	0.3	0.8	0.3	0.2	NA		ND
GA:SAVANNAH	80.0	1.2	0.9	0.1	0.3	0.6	0.1	NA		ND
HI:HONOLULU	209.8	1.5	1.1	0.2	0.7	0.2	0.2	NA		ND
IA:CEDAR RAPIDS	180.8	2.8	1.2	0.9	0.8	0.1	0.5	NA		ND
ID:BOISE	84.0	1.7	0.9	0.2	0.3	0.1	0.2	NA		ND
ID:IDAHO FALLS	245.2	4.7	2.0	0.2	1.2	0.3	0.6	NA		ND
IL:MORRIS	317.5	16.6	2.9	18.9	3.4	0.1	0.1	5.8	0.1	ND
IL:W. CHICAGO	299.2	22.9	2.8	22.6	3.5	0.1	0.2	6.9	0.1	ND
KS:TOPEKA	346.8	5.5	2.2	1.9	1.5	-0.3	0.3	0.1	0.0	ND
LA:NEW ORLEANS	192.5	2.4	1.1	0.9	0.8	0.1	0.2	NA		ND
MA:LAWRENCE	106.8	1.1	0.8	0.2	0.5	0.1	0.1	NA		ND
MA:ROWE	41.6	0.3	1.2	0.1	0.4	0.1	0.0	NA		ND
MD:BALTIMORE	127.4	1.2	1.0	0.1	0.5	-0.1	0.1	NA		ND
MD:CONOWINGO	211.0	2.6	1.2	0.4	0.7	0.1	0.1	NA		ND
ME:AUGUSTA	46.6	1.1	0.9	0.0	0.0	-0.1	0.2	NA		ND
MI:DETROIT	115.8	1.7	0.9	0.2	0.5	0.8	0.2	NA		ND
MI:GRAND RAPIDS	162.5	2.3	1.2	0.1	0.6	0.6	0.2	NA		ND
MN:MINNEAPOLIS	118.8	2.3	0.9	0.2	0.5	0.1	0.2	NA		ND
MN:RED WING	289.6	5.3	1.8	6.4	1.9	0.4	0.3	2.9	0.1	ND
MO:JEFFERSON CITY	212.0	3.7	1.4	0.5	0.7	0.1	0.2	NA		ND
MS:JACKSON	107.6	2.1	1.0	0.2	0.5	0.4	0.5	NA		ND
MS:PORT GIBSON	342.0	3.6	1.9	1.2	1.4	0.1	0.1	NA		ND

Table 12 (continued)

Drinking Water  
Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations  
January - December 1986 Composites

Location	Total Solids (mg/l)	Gross Beta		Gross Alpha		<sup>90</sup> Sr		<sup>226</sup> Ra		Specific Gamma Activity
		pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	
MT:HELENA	184.3	2.5	1.2	1.3	0.9	0.4	0.4	NA		ND
NC:CHARLOTTE	52.4	1.7	0.9	0.1	0.3	0.2	0.1	NA		ND
ND:BISMARCK	288.4	2.4	0.8	3.4	1.3	0.0	0.0	0.1	0.0	ND
NE:LINCOLN	389.5	11.1	2.8	1.1	1.4	0.2	0.3	NA		ND
NH:CONCORD	65.2	0.6	0.7	0.1	0.3	0.1	0.1	NA		ND
NJ:TRENTON	138.8	0.6	0.8	0.3	0.5	0.4	0.1	NA		ND
NJ:WARETOWN	65.4	1.2	0.8	0.1	0.3	0.1	0.1	NA		ND
NM:SANTA FE	286.4	7.6	15.0	52.1	10.0	0.0	0.0	0.2	0.1	ND
NV:LAS VEGAS	542.5	3.0	2.0	3.4	2.0	0.1	0.0	0.2	0.0	ND
NY:ALBANY	102.0	0.1	0.1	2.1	0.7	0.3	0.3	0.0	0.0	ND
NY:NEW YORK CITY	42.4	0.6	0.7	0.2	0.3	0.3	0.2	NA		ND
NY:NIAGARA FALLS	154.9	1.2	0.9	0.3	0.6	0.7	0.2	NA		ND
NY:SYRACUSE	133.1	1.6	1.0	0.3	0.5	0.6	0.1	NA		ND
OH:CINCINNATI	185.3	2.2	1.3	0.7	0.9	0.3	0.3	NA		ND
OH:COLUMBUS	202.0	3.4	1.6	0.4	0.8	0.1	0.2	NA		ND
OH:EAST LIVERPOOL	207.7	1.3	1.2	0.3	0.7	0.3	0.1	NA		ND
OH:PAINESVILLE	142.5	1.6	1.1	0.3	0.6	0.3	0.6	NA		ND
OH:TOLEDO	118.2	2.8	1.0	0.2	0.5	0.1	0.1	NA		ND
OK:OKLAHOMA CITY	61.6	2.2	0.9	0.1	0.3	0.2	0.3	NA		ND
OR:PORTLAND	18.8	0.6	0.8	0.1	0.2	-0.3	0.2	NA		ND
PA:COLUMBIA	186.9	2.4	1.3	0.3	0.8	0.1	0.3	NA		ND
PA:HARRISBURG	35.4	0.8	0.9	0.1	0.2	0.2	0.2	NA		ND
PA:PITTSBURGH	136.3	1.3	1.0	0.4	0.6	0.2	0.2	NA		ND
PC:ANCON	86.2	0.8	0.6	0.9	0.5	0.2	0.4	NA		ND
RI:PROVIDENCE	60.0	1.0	0.8	0.0	0.3	0.3	0.2	NA		ND
SC:BARNWELL	36.0	1.3	0.8	0.3	0.3	0.0	0.1	NA		ND
SC:BARNWELL	80.0	2.2	0.9	0.2	0.3	0.3	0.2	NA		ND
SC:HARTSVILLE	25.8	1.5	0.7	1.1	0.4	0.1	0.4	NA		ND
SC:JENKINSVILLE	184.8	6.1	1.0	25.8	2.9	0.1	0.3	2.3	0.1	ND
SC:SENECA	35.4	1.2	0.8	0.1	0.2	0.3	0.1	NA		ND
TN:CHATTANOOGA	118.8	2.0	0.9	0.1	0.4	0.1	0.2	NA		ND
TN:KNOXVILLE	143.0	1.6	1.0	0.1	0.5	0.4	0.1	NA		ND
TX:AUSTIN	187.3	4.4	1.4	0.0	0.0	0.0	0.3	NA		ND
VA:DOSWELL	128.8	4.5	1.2	0.3	0.5	0.1	0.3	NA		ND
VA:LYNCHBURG	87.6	1.5	0.9	0.1	0.3	0.1	0.1	NA		ND
VA:VIRGINIA BEACH	122.0	3.2	1.0	0.0	0.0	0.4	0.2	NA		ND
VI:ST. THOMAS	27.2	0.1	0.7	0.0	0.2	0.2	0.4	NA		ND

Table 12 (continued)

Drinking Water  
 Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations  
 January December 1986 Composites

Location	Total Solids (mg/l)	Gross Beta		Gross Alpha		<sup>90</sup> Sr		<sup>226</sup> Ra		Specific Gamma Activity
		pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	pCi/l	±2σ	
WA:RICHLAND	86.6	1.5	0.9	0.4	0.4	0.0	0.1	NA		ND
WA:SEATTLE	36.8	0.5	0.8	0.1	0.2	0.1	0.2	NA		ND
WI:GENOA CITY	186.0	1.0	0.9	1.0	1.0	0.0	0.2	NA		ND
WI:MADISON	199.0	1.0	1.0	1.7	1.0	0.0	0.3	NA		ND

σ = Sigma Counting Error.

NA = No Analysis.

ND = No Gamma Activity Detectable.

ENVIRONMENTAL RADIATION  
AMBIENT MONITORING SYSTEM (ERAMS)

Section III. External Gamma Ambient Monitoring Program

The external gamma monitoring program, 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.<sup>†</sup> Although exposure measurements at these few sites are not totally representative of nationwide exposures, they do indicate national trends.

The monitoring 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 EERF 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.

Table 13 contains the data for environmental gamma ambient monitoring program July - September 1987.

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<sup>†</sup> Some of these sites may not return dosimeters each period and consequently the number of sites listed may vary slightly.

**Table 13**  
**Environmental Gamma Ambient Monitoring Program**  
**July September 1987**

Location	Date Range	Integrated Exposure mR	Exposure Rate $\mu\text{R/hr} \pm 2\sigma$	
AL:MONTGOMERY	07/01/87-09/30/87	17.3	7.9	4.2
CO:DENVER	07/08/87-10/01/87	33.5	16.4	5.7
FL:ORLANDO	07/01/87-09/30/87	15.4	7.1	5.0
ID:BOISE	07/13/87-10/02/87	22.9	11.8	4.9
IL:CHICAGO	07/09/87-10/13/87	21.0	9.1	4.2
ND:BISMARCK	06/07/87-10/01/87	23.5	8.4	2.8
NJ:TRENTON	07/01/87-10/01/87	39.1	17.7	4.5
NM.SANTA FE	07/01/87-09/30/87	32.5	14.9	3.4
NV:LAS VEGAS	06/30/87-09/30/87	18.0	8.2	3.5
NY:NEW YORK	07/14/87-11/24/87	30.6	9.6	2.1
OH:COLUMBUS	07/01/87-09/29/87	18.4	8.5	4.5
OK:OKLAHOMA CITY	07/07/87-10/02/87	17.3	8.3	5.4
OR:PORTLAND	06/30/87-09/30/87	17.4	7.9	4.5
PA:HARRISBURG	07/02/87-10/02/87	15.7	7.1	4.5
PA:PITTSBURGH	07/02/87-10/05/87	26.5	11.6	5.4
RI:PROVIDENCE	07/01/87-10/01/87	23.5	10.6	7.1
SC:BARMWELL	07/10/87-10/15/87	20.7	8.9	7.5
SC:COLUMBIA	06/30/87-09/29/87	26.0	11.9	3.4
VA:RICHMOND	07/07/87-09/30/87	19.1	8.7	2.6

$\sigma$  = Sigma Counting Error (in percent).

ENVIRONMENTAL RADIATION  
AMBIENT MONITORING SYSTEM (ERAMS)

Section IV. 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 which 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 one or more 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, which include iodine-131, barium-140, cesium-137, and potassium. All samples collected in July are analyzed for strontium-89, and 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-89 and strontium-90.

Iodine-131, barium-140, cesium-137 and potassium are determined by gamma spectral analysis. Strontium-89 and strontium-90 are determined by beta counting a total strontium precipitate which has been chemically separated by ion-exchange.

Tables 14-16 contain the data for concentrations of radionuclides in pasteurized milk July - September 1987.

Table 17 contains the data for concentrations of strontium-90 and strontium-89 in pasteurized milk July September 1987.

**Table 14**  
**Concentrations of Radionuclides**  
**in Pasteurized Milk**

July 1987

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
AK: ANCHORAGE	07/09/87	1.48	0.13	2	7	6	9	3	7
AL: MONTGOMERY	07/10/87	1.50	0.13	10	9	5	9	3	7
AR: LITTLE ROCK	07/07/87	1.57	0.13	9	7	0	9	5	7
AZ: PHOENIX	07/08/87	1.57	0.13	2	7	1	9	5	7
CA: LOS ANGELES	07/23/87	1.56	0.13	5	9	3	9	0	7
CA: SACRAMENTO	07/29/87	1.60	0.08	-1	4	-4	5	4	4
CA: SAN FRANCISCO	07/21/87	1.64	0.13	0	9	1	9	-2	7
CO: DENVER	07/01/87	1.54	0.13	8	9	-4	9	-2	7
CT: HARTFORD	07/06/87	1.51	0.13	2	7	-3	9	2	7
DC: WASHINGTON	07/07/87	1.51	0.09	10	6	-3	6	1	5
DE: WILMINGTON	07/13/87	1.55	0.13	17	9	7	10	7	8
FL: TAMPA	07/07/87	1.55	0.13	10	7	-2	9	-1	7
GA: ATLANTA	07/06/87	1.47	0.09	8	6	3	7	-4	5
HI: HONOLULU	07/13/87	1.57	0.09	10	6	4	7	-2	5
IA: DES MOINES	07/06/87	1.60	0.09	1	5	-3	6	5	5
IL: CHICAGO	07/06/87	1.57	0.13	3	7	-3	9	7	7
IN: INDIANAPOLIS	07/06/87	1.59	0.09	5	5	-5	6	1	5
KS: WICHITA	07/07/87	1.57	0.13	8	9	1	9	2	7
KY: LOUISVILLE	07/07/87	1.59	0.13	15	9	9	10	5	7
LA: NEW ORLEANS	07/08/87	1.43	0.12	12	9	-5	9	3	7
MD: BALTIMORE	07/02/87	1.68	0.13	5	9	0	9	-3	7
ME: PORTLAND	07/03/87	1.41	0.09	9	5	-5	6	5	5
MI: DETROIT	07/09/87	1.54	0.13	9	9	-1	9	1	7
MI: GRAND RAPIDS	07/06/87	1.59	0.13	5	7	-5	9	4	7
MN: MINNEAPOLIS	07/06/87	1.62	0.13	4	7	1	9	1	7
MN: ST. PAUL	07/01/87	1.79	0.25	10	18	-1	19	8	14
MO: KANSAS CITY	07/09/87	1.52	0.13	8	7	3	9	3	7
MO: ST. LOUIS	07/08/87	1.58	0.13	3	7	-1	9	2	7
MS: JACKSON	07/13/87	1.52	0.13	12	9	-5	9	-2	7
MT: HELENA	07/30/87	1.66	0.09	4	5	1	6	6	5
NC: CHARLOTTE	07/13/87	1.51	0.24	17	18	9	19	8	14
ND: MINOT	07/29/87	1.50	0.13	-1	7	4	9	2	7
NE: OMAHA	07/10/87	1.27	0.12	11	9	3	9	-4	7
NH: MANCHESTER	07/07/87	1.50	0.13	4	7	3	9	1	7
NJ: TRENTON	07/08/87	1.44	0.13	15	9	5	9	-1	7
NM: ALBUQUERQUE	07/06/87	1.50	0.13	13	9	2	9	-4	7
NV: LAS VEGAS	07/08/87	1.50	0.13	4	7	-2	9	3	7



Table 14 (continued)  
 Concentrations of Radionuclides  
 in Pasteurized Milk  
 July 1987

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
NY:BUFFALO	07/07/87	1.52	0.13	9	9	4	9	5	7
NY:NEW YORK CITY	07/06/87	1.46	0.13	10	9	8	10	2	7
NY:SYRACUSE	07/06/87	1.51	0.09	3	5	-3	6	4	5
OH:CLEVELAND	07/15/87	1.62	0.24	4	18	-12	18	-4	14
OK:OKLAHOMA CITY	07/07/87	1.76	0.13	1	7	-1	9	6	7
OR:PORTLAND	07/06/87	1.61	0.13	3	9	5	9	-2	7
PA:PHILADELPHIA	07/06/87	1.56	0.13	6	9	2	9	1	7
PA:PITTSBURGH	07/07/87	1.57	0.13	6	9	-2	9	5	7
PC:CRISTOBAL	07/23/87	1.49	0.13	14	7	5	9	-2	7
PR:SAN JUAN	07/16/87	1.60	0.13	6	9	2	9	3	7
SC:CHARLESTON	07/14/87	1.51	0.13	11	9	6	10	-4	7
SD:RAPID CITY	07/06/87	1.54	0.13	4	7	1	9	2	7
TN:CHATTANOOGA	07/06/87	1.46	0.13	4	9	6	9	-5	7
TN:KNOXVILLE	07/06/87	1.68	0.13	5	9	0	9	-1	7
TN:MEMPHIS	07/29/87	1.59	0.13	4	7	2	9	3	7
TX:AUSTIN	07/30/87	1.50	0.13	5	9	-2	9	5	7
TX:FT. WORTH	07/07/87	1.54	0.06	10	4	1	5	8	4
UT:SALT LAKE CITY	07/06/87	1.61	0.13	2	7	0	9	-1	7
VA:NORFOLK	07/02/87	1.54	0.13	6	9	3	9	-5	7
VT:BURLINGTON	07/02/87	1.49	0.13	7	9	5	9	-3	7
WA:SEATTLE	07/01/87	1.45	0.13	4	9	-1	9	1	7
WA:SPOKANE	07/06/87	1.61	0.09	7	5	-1	6	6	5
WV:CHARLESTON	07/13/87	1.66	0.25	1	18	-3	19	-1	14
WY:LARAMIE	07/07/87	1.68	0.13	6	7	-2	9	0	7

σ = Sigma Counting Error.

**Table 15**  
**Concentrations of Radionuclides**  
**in Pasteurized Milk**  
**August 1987**

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
AK: ANCHORAGE	08/11/87	1.49	0.13	5	9	0	9	-1	7
AL: MONTGOMERY	08/07/87	1.61	0.13	6	7	-2	9	6	7
AR: LITTLE ROCK	08/03/87	1.60	0.13	3	7	0	9	7	7
AZ: PHOENIX	08/05/87	1.39	0.12	4	9	3	9	-2	7
CA: OAKLAND	08/11/87	1.67	0.13	0	7	3	9	8	7
CO: DENVER	08/03/87	1.26	0.12	2	7	-1	9	3	7
CT: HARTFORD	08/10/87	1.48	0.13	3	9	-6	9	3	7
DE: WILMINGTON	08/03/87	1.57	0.13	11	9	8	10	1	7
FL: TAMPA	08/04/87	1.58	0.13	11	9	4	9	-1	7
GA: ATLANTA	08/03/87	1.08	0.12	16	9	1	9	3	7
HI: HONOLULU	08/04/87	1.66	0.13	4	7	-1	9	8	7
IA: DES MOINES	08/03/87	1.55	0.13	10	9	8	10	7	8
IL: CHICAGO	08/03/87	1.53	0.13	1	7	2	9	9	7
IN: INDIANAPOLIS	08/03/87	1.54	0.13	9	9	-1	9	2	7
KS: WICHITA	08/17/87	1.53	0.09	-1	5	-4	6	4	5
KY: LOUISVILLE	08/04/87	1.24	0.12	11	9	2	9	-1	7
LA: NEW ORLEANS	08/21/87	1.67	0.13	10	9	-5	9	3	7
MD: BALTIMORE	08/07/87	1.63	0.13	11	9	0	9	1	7
ME: PORTLAND	08/04/87	1.61	0.13	6	7	2	9	5	7
MI: DETROIT	08/06/87	1.50	0.09	9	6	-1	6	2	5
MI: GRAND RAPIDS	08/03/87	1.55	0.13	11	9	-4	9	5	7
MN: MINNEAPOLIS	08/03/87	1.62	0.13	12	9	-3	9	11	7
MN: ST. PAUL	08/10/87	1.59	0.13	0	7	-3	9	5	7
MO: KANSAS CITY	08/06/87	1.52	0.13	13	9	2	9	7	7
MO: ST. LOUIS	08/04/87	1.55	0.13	6	9	6	9	-4	7
MS: JACKSON	08/04/87	1.52	0.13	8	7	-3	9	3	7
MT: HELENA	08/14/87	1.51	0.13	6	9	-1	9	7	7
NC: CHARLOTTE	08/10/87	1.50	0.24	15	18	1	19	3	14
ND: MINOT	08/27/87	1.54	0.13	2	7	4	9	5	7
NE: OMAHA	08/07/87	1.35	0.12	8	7	-1	9	8	7
NH: MANCHESTER	08/17/87	1.32	0.07	11	5	3	5	0	4
NJ: TRENTON	08/05/87	1.54	0.13	3	7	0	9	4	7
NM: ALBUQUERQUE	08/04/87	1.57	0.13	8	9	-2	9	3	7
NV: LAS VEGAS	08/03/87	1.53	0.13	11	9	8	10	-5	7
NY: BUFFALO	08/03/87	1.66	0.13	3	9	2	9	3	7
NY: NEW YORK CITY	08/03/87	1.59	0.09	5	5	4	6	8	5
NY: SYRACUSE	08/04/87	1.66	0.13	9	7	2	9	10	7

**Table 15 (continued)**  
**Concentrations of Radionuclides**  
**in Pasteurized Milk**  
**August 1987**

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
OH:CINCINNATI	08/31/87	1.53	0.13	3	7	3	9	8	7
OK:OKLAHOMA CITY	08/03/87	1.66	0.13	14	9	7	10	1	7
OR:PORTLAND	08/10/87	1.65	0.09	2	5	1	6	-2	5
PA:PHILADELPHIA	08/03/87	1.60	0.09	7	5	-1	6	4	5
PA:PITTSBURGH	08/03/87	1.52	0.13	2	7	1	9	4	7
PC:CRISTOBAL	08/24/87	1.48	0.09	7	5	-3	6	3	5
PR:SAN JUAN	08/14/87	1.57	0.13	5	9	-5	9	-1	7
SD:RAPID CITY	08/03/87	1.63	0.09	8	6	4	7	1	5
TN:CHATTANOOGA	08/03/87	1.55	0.13	10	9	9	10	4	7
TN:KNOXVILLE	08/03/87	1.11	0.12	12	9	-2	9	0	7
TN:MEMPHIS	08/25/87	1.47	0.13	9	9	-2	9	4	7
TX:AUSTIN	08/05/87	1.51	0.09	5	6	1	6	-1	5
TX:FT. WORTH	08/17/87	1.51	0.09	2	6	4	6	-1	5
UT:SALT LAKE CITY	08/03/87	1.54	0.13	3	9	-2	9	2	7
VA:NORFOLK	08/06/87	1.61	0.13	4	7	-3	9	-1	7
WA:SEATTLE	08/06/87	1.62	0.13	15	9	-3	9	4	7
WA:SPOKANE	08/13/87	1.57	0.09	9	6	6	7	5	5
WV:CHARLESTON	08/26/87	1.77	0.25	9	18	-17	18	0	14
WY:LARAMIE	08/05/87	1.60	0.13	4	7	-2	9	4	7

σ = Sigma Counting Error.

**Table 16**  
**Concentrations of Radionuclides**  
**in Pasteurized Milk**  
**September 1987**

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	09/11/87	1.50	0.13	5	7	6	9	5	7
AR:LITTLE ROCK	09/01/87	1.46	0.09	5	5	2	6	8	5
AZ:PHOENIX	09/09/87	1.59	0.13	3	7	-2	9	5	7
CA:LOS ANGELES	09/03/87	1.54	0.13	9	7	0	9	2	7
CA:SACRAMENTO	09/01/87	1.51	0.13	3	7	-6	9	5	7
CA:SAN FRANCISCO	09/11/87	1.36	0.08	14	6	-1	6	2	5
CO:DENVER	09/30/87	1.41	0.09	4	6	2	6	2	5
CT:HARTFORD	09/14/87	1.54	0.09	16	6	4	7	8	6
DE:WILMINGTON	09/08/87	1.55	0.13	5	9	-6	10	-4	15
FL:TAMPA	09/01/87	1.59	0.13	8	7	-2	9	5	7
GA:ATLANTA	09/08/87	1.51	0.13	7	7	-3	9	8	7
HI:HONOLULU	09/01/87	1.63	0.13	4	7	6	9	8	7
IA:DES MOINES	09/08/87	1.51	0.13	7	11	5	11	-11	15
IL:CHICAGO	09/01/87	1.32	0.12	20	9	4	9	2	7
IN:INDIANAPOLIS	09/06/87	1.52	0.14	-1	11	-5	11	-19	16
KS:WICHITA	09/10/87	1.51	0.13	8	7	-5	9	2	7
KY:LOUISVILLE	09/08/87	1.51	0.13	2	9	-5	10	-2	15
MD:BALTIMORE	09/04/87	1.59	0.13	11	9	2	9	6	7
ME:PORTLAND	09/01/87	1.75	0.25	6	18	-6	19	5	14
MI:DETROIT	09/10/87	1.58	0.13	4	7	-5	9	-4	7
MI:GRAND RAPIDS	09/08/87	1.55	0.13	5	9	5	10	0	15
MN:MINNEAPOLIS	09/09/87	1.53	0.13	2	7	-6	9	4	7
MN:ST. PAUL	09/01/87	1.63	0.17	15	13	-2	13	8	10
MO:KANSAS CITY	09/11/87	1.17	0.12	7	9	-2	9	8	7
MO:ST. LOUIS	09/02/87	1.54	0.09	2	5	-2	6	0	5
MS:JACKSON	09/09/87	1.59	0.13	5	7	4	9	-3	7
MT:HELENA	09/03/87	1.25	0.12	2	9	1	9	5	7
NC:CHARLOTTE	09/14/87	1.75	0.18	10	13	-2	13	1	10
NE:OMAHA	09/11/87	1.26	0.12	16	9	-2	9	5	7
NH:MANCHESTER	09/14/87	1.52	0.13	10	7	0	9	1	7
NJ:TRENTON	09/09/87	1.31	0.12	10	9	-1	9	3	7
NM:ALBUQUERQUE	09/08/87	1.29	0.13	4	9	1	10	-10	15
NV:LAS VEGAS	09/21/87	1.47	0.12	0	7	-2	9	3	7
NY:BUFFALO	09/15/87	1.41	0.09	15	6	3	6	1	5
NY:NEW YORK CITY	09/14/87	1.50	0.09	5	6	6	7	10	5
NY:SYRACUSE	09/08/87	1.69	0.14	5	12	0	11	-14	16
OR:PORTLAND	09/09/87	1.40	0.12	6	7	5	9	3	7

**Table 16 (continued)**  
**Concentrations of Radionuclides**  
**in Pasteurized Milk**  
**September 1987**

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	$\pm 2\sigma$
PA:PHILADELPHIA	09/08/87	1.37	0.12	15	9	2	9	5	7
PA:PITTSBURGH	09/08/87	1.55	0.13	-1	7	1	9	-2	7
PC:CRISTOBAL	09/24/87	1.44	0.12	22	7	0	9	8	7
PR:SAN JUAN	09/11/87	1.50	0.13	14	9	-4	9	-2	7
SD:RAPID CITY	09/08/87	1.62	0.13	-3	8	-7	10	3	15
TN:CHATTANOOGA	09/08/87	1.48	0.13	-3	11	-4	11	-14	15
TN:KNOXVILLE	09/08/87	1.44	0.13	6	11	-1	11	-11	15
TN:MEMPHIS	09/15/87	1.62	0.13	1	7	-1	9	5	7
TX:FT. WORTH	09/17/87	1.65	0.13	2	7	-6	9	4	7
UT:SALT LAKE CITY	09/07/87	1.47	0.09	8	6	4	6	-1	5
VA:NORFOLK	09/01/87	1.54	0.09	4	5	2	6	4	5
VT:BURLINGTON	09/04/87	1.49	0.09	5	5	-4	6	2	5
WA:SEATTLE	09/04/87	1.50	0.09	5	5	-4	6	4	5
WA:SPOKANE	09/22/87	1.68	0.13	0	7	-3	9	4	7
WV:CHARLESTON	09/22/87	1.53	0.24	11	18	1	19	10	14
WY:LARAMIE	09/10/87	1.44	0.12	2	7	-1	9	6	7

$\sigma$  = Sigma Counting Error.

**Table 17**  
**Strontium-90 and Strontium-89 in Pasteurized Milk**  
**EPA Location Composites**

July - September 1987

EPA Location	Date	<sup>90</sup> Sr		<sup>89</sup> Sr	
		pCi/l	±2σ	pCi/l	±2σ*
AK: ANCHORAGE	07/09/87	0.7	1.0	3	2
AL: MONTGOMERY	07/10/87	2.4	1.3	0	2
AR: LITTLE ROCK	07/07/87	4.2	0.8	-3	4
AZ: PHOENIX	07/08/87	0.2	0.2	1	1
CA: LOS ANGELES	07/23/87	0.3	0.5	1	2
CA: SACRAMENTO	07/02/87	0.9	0.5	-1	2
CA: SAN FRANCISCO	07/21/87	0.3	0.5	1	1
CO: DENVER	07/01/87	1.5	1.7	1	6
CT: HARTFORD	07/06/87	2.2	0.7	0	2
DC: WASHINGTON	07/07/87	1.8	0.9	0	4
DE: WILMINGTON	07/13/87	3.7	0.9	-2	1
FL: TAMPA	07/07/87	1.2	0.4	0	1
GA: ATLANTA	07/06/87	0.8	0.4	1	1
HI: HONOLULU	07/13/87	0.7	0.4	1	1
IA: DES MOINES	07/06/87	1.7	0.3	1	1
IL: CHICAGO	07/06/87	2.3	0.9	0	3
IN: INDIANAPOLIS	07/06/87	2.3	0.5	-1	2
KS: WICHITA	07/07/87	2.9	0.8	0	2
KY: LOUISVILLE	07/07/87	1.5	0.6	2	3
LA: NEW ORLEANS	07/15/87	3.8	0.4	-2	2
MD: BALTIMORE	07/02/87	2.2	0.6	-1	3
ME: PORTLAND	07/03/87	2.6	0.7	-2	3
MI: DETROIT	07/09/87	2.5	1.1	-1	2
MI: GRAND RAPIDS	07/06/87	3.0	1.3	-1	4
MN: MINNEAPOLIS	07/06/87	3.6	1.4	0	5
MN: ST. PAUL	07/01/87	3.8	1.0	-2	4
MO: KANSAS CITY	07/09/87	2.3	1.5	-1	3
MO: ST. LOUIS	07/08/87	2.6	1.3	-1	3
MS: JACKSON	07/13/87	2.3	0.6	0	2
MT: HELENA	07/30/87	1.4	0.5	1	1
NC: CHARLOTTE	07/13/87	2.3	1.4	0	2
ND: MINOT	07/29/87	4.4	0.6	-3	2
NE: OMAHA	07/10/87	1.8	0.3	0	1
NH: MANCHESTER	07/07/87	2.5	2.0	0	4
NJ: TRENTON	07/08/87	3.0	0.4	-1	1
NM: ALBUQUERQUE	07/06/87	1.3	1.1	-1	4
NV: LAS VEGAS	07/08/87	1.1	0.6	-1	1

Table 17 (continued)

Strontium-90 and Strontium-89 in Pasteurized Milk  
EPA Location Composites

July - September 1987

EPA Location	Date	<sup>90</sup> Sr		<sup>89</sup> Sr	
		pCi/l	±2σ	pCi/l	±2σ*
NY:BUFFALO	07/07/87	1.8	1.9	1	4
NY:NEW YORK CITY	07/06/87	2.7	0.6	0	2
NY:SYRACUSE	07/06/87	0.3	2.8	5	6
OH:CLEVELAND	07/15/87	3.4	0.8	-2	3
OK:OKLAHOMA CITY	07/07/87	2.2	0.5	0	1
OR:PORTLAND	07/06/87	3.1	0.9	-2	3
PA:PHILADELPHIA	07/06/87	1.0	2.4	2	5
PA:PITTSBURGH	07/07/87	3.0	1.3	0	3
PC:CRISTOBAL	07/23/87	1.0	0.8	0	2
PR:SAN JUAN	07/16/87	0.4	0.5	1	2
SC:CHARLESTON	07/14/87	2.0	1.0	0	2
SD:RAPID CITY	07/06/87	1.9	1.5	1	3
TN:CHATTANOOGA	07/06/87	2.8	3.0	-4	11
TN:KNOXVILLE	07/06/87	2.3	0.6	0	2
TN:MEMPHIS	07/29/87	3.4	0.8	-1	2
TX:FT. WORTH	07/14/87	1.9	0.4	0	1
UT:SALT LAKE CITY	07/06/87	0.3	2.1	3	4
VA:NORFOLK	07/02/87	1.6	0.5	-1	2
VT:BURLINGTON	07/02/87	2.4	0.4	-1	1
WA:SEATTLE	07/01/87	1.2	0.4	0	1
WA:SPOKANE	07/06/87	1.8	0.5	0	1
WV:CHARLESTON	07/13/87	3.2	0.9	-1	3
WY:LARAMIE	07/07/87	2.4	0.6	-1	1

σ = Sigma Counting Error.

σ\* = Analytical Error Term.

## 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.

Analysis consists of combusting the samples and measuring released carbon dioxide through liquid scintillation.

The last carbon-14 results were for samples collected during May 1975 and May 1979. They were published in Environmental Radiation Data: Report 29.



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