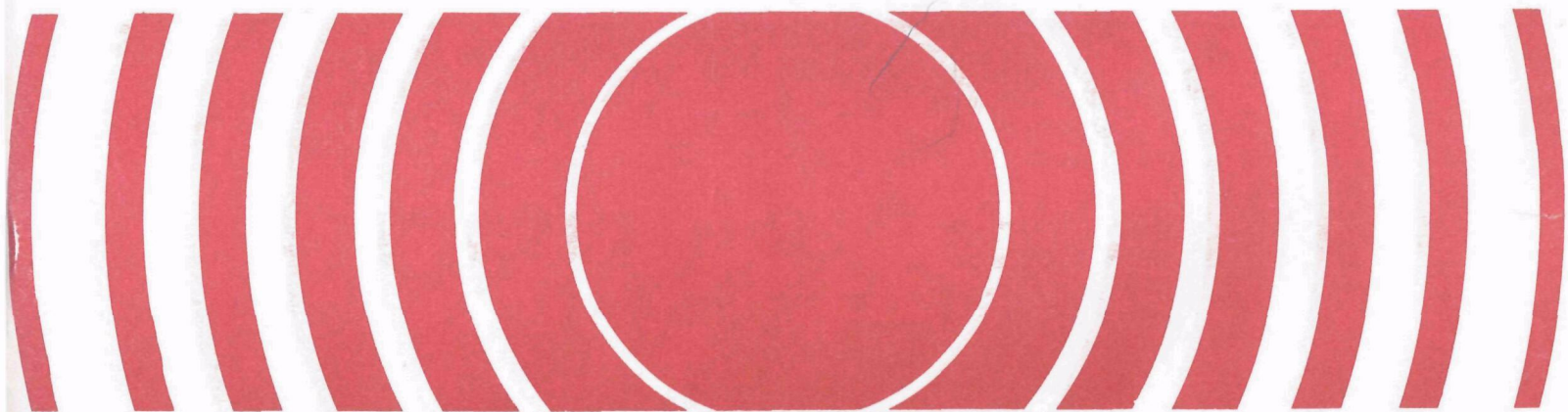

Radiation



Environmental Radiation Data

Report 48

October 1986 - December 1986



E N V I R O N M E N T A L

R A D I A T I O N

D A T A

REPORT 48

October - December 1986

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 releases into the environment from stationary sources such as nuclear power reactors, fuel fabrication facilities, and reprocessing plants.

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).

E N V I R O N M E N T A L R A D I A T I O N
D A T A

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DATA - Reporting Rationale and Procedures

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. This occurs when the background count is subtracted from a sample which has only background activity. 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 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 decay to the collection date of the sample.

Potassium concentrations are determined by specific activity analyses.

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 minimum detectable levels for each isotope are shown in Table 1. Smallest 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

<u>Radionuclide</u>	<u>Media</u>	<u>Reporting Units</u>	<u>Reporting Increments</u>	<u>Minimum Detectable Levels</u>
Gross alpha	Water	pCi/l	1 pCi/l	2 pCi/l
Gross beta	Air	pCi/m ³	.01 pCi/m ³	.01 pCi/m ³
	Water	pCi/l	1 pCi/l	1 pCi/l
	Precipitation	nCi/m ²	.01 nCi/m ²	.01 nCi/m ^{2(a)}
Tritium	Water	nCi/l	.1 nCi/l	.2 nCi/l
	Milk	nCi/l	.1 nCi/l	.2 nCi/l
Carbon-14	Milk	pCi/l	1 pCi/l	15 pCi/l
Krypton-85	Ambient Air	pCi/m ³	.1 pCi/m ³	2 pCi/m ³
Plutonium-238, 239, 240	Air	aCi/m ³	.1 aCi/m ³	.015 pCi ^(b) per sample (c)
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Uranium-234, 235,238	Air	aCi/m ³	.1 aCi/m ³	.015 pCi ^(b) per sample
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Radium-226	Water	pCi/l	.1 pCi/l	.1 pCi/l

<u>Radionuclide</u>	<u>Media</u>	<u>Reporting Units</u>	<u>Reporting Increments</u>	<u>Minimum Detectable Levels</u>
Strontium-90	Milk	pCi/l	.1 pCi/l	1 pCi/l
	Water	pCi/l	.1 pCi/l	1 pCi/l
Strontium-89	Milk	pCi/l	1 pCi/l	5 pCi/l ^(d)
Iodine-131	Milk	pCi/l	1 pCi/l	10 pCi/l ^(d)
	Water	pCi/l	1 pCi/l	10 pCi/l ^(d)
	Water (specific radiochemical analysis)	pCi/l	.1 pCi/l	.4 pCi/l ^(d)
Iodine-129	Milk	fCi/l	.1 fCi/l	.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 ^(d)
	Water	pCi/l	1 pCi/l	10 pCi/l ^(d)
Potassium	Milk	g/l	.1 g/l	.12 g/l
	Water	g/l	.1 g/l	.12 g/l
Potassium-40	Water	pCi/l	1 pCi/l	100 pCi/l

- (a) The value in terms of nCi/m^2_3 would be dependent on precipitation (mm).
(b) This value in terms of pCi/m^3 would be dependent on the air volume.
(c) Measurement by alpha spectroscopy which includes contributions of plutonium-239 and plutonium-240.
(d) 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 * 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/m³. 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 these 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.

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

Tables 2 - 4 contain the data in airborne particulate samples for October - December 1986.

Tables 5 - 7 contain the data in precipitation samples for October - December 1986.

Data for the tritium in precipitation samples for October - December 1986 at the selected stations are shown in Table 8.

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

TABLE 2
AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
OCTOBER 1986

LOCATION	#	SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
			MAX	MIN	AVG	MAX	MIN	AVG
			(pCi/m ³)			(pCi/m ³)		
AL:ASHFORD	5		0.0	0.0	0.0	0.01	0.00	0.01
AL:MONTGOMERY	9		1.6	0.2	0.9	0.03	0.01	0.01
AR:LITTLE ROCK	8		0.5	0.1	0.2	0.02	0.01	0.02
AZ:PHOENIX	6		2.8	0.2	1.8	0.03	0.02	0.02
CA:BERKELEY	5		0.1	0.0	0.1	0.03	0.01	0.02
CA:LOS ANGELES	9		0.5	0.1	0.3	0.03	0.01	0.02
CO:DENVER	9		1.5	0.2	0.9	0.01	0.01	0.01
CT:HARTFORD	9		0.4	0.1	0.2	0.01	0.01	0.01
DE:WILMINGTON	9		0.5	0.0	0.2	0.02	0.01	0.01
FL:JACKSONVILLE	9		0.2	0.0	0.1	0.01	0.00	0.01
FL:MIAMI	8		0.0	0.0	0.0	0.01	0.00	0.00
GA:ATLANTA	4		0.0	0.0	0.0	0.02	0.01	0.01
HI:HONOLULU	9		0.0	0.0	0.0	0.01	0.00	0.01
IA:IOWA CITY	9		0.4	0.0	0.2	0.03	0.01	0.01
ID:BOISE	6		0.9	0.0	0.3	0.03	0.00	0.02
ID:IDAHO FALLS	9		0.0	0.0	0.0	0.02	0.01	0.01
IL:CHICAGO	9		0.6	0.0	0.2	0.04	0.00	0.01
IN:INDIANAPOLIS	9		0.8	0.2	0.4	0.02	0.00	0.01
KS:TOPEKA	9		1.4	0.2	0.5	0.03	0.01	0.01
KY:FRANKFORT	8		2.7	0.2	1.2	0.07	0.01	0.03
LA:NEW ORLEANS	4		0.1	0.0	0.1	0.01	0.01	0.01
MA:LAWRENCE	9		0.4	0.1	0.2	0.02	0.01	0.01
ME:AUGUSTA	5		0.2	0.0	0.1	0.01	0.01	0.01
MI:LANSING	9		0.2	0.0	0.1	0.03	0.00	0.01
MN:MINNEAPOLIS	9		0.7	0.1	0.3	0.03	0.01	0.02
MO:JEFFERSON CITY	8		0.9	0.1	0.3	0.03	0.01	0.01
MS:JACKSON	9		1.4	0.0	0.6	0.04	0.01	0.02
NC:CHARLOTTE	9		0.7	0.2	0.3	0.03	0.01	0.01
NC:WILMINGTON	9		0.1	0.1	0.1	0.02	0.01	0.01
ND:BISMARCK	9		3.3	0.2	1.2	0.03	0.01	0.02
NE:LINCOLN	4		0.9	0.1	0.4	0.02	0.01	0.01
NH:CONCORD	9		0.2	0.0	0.1	0.01	0.00	0.01
NJ:TRENTON	9		1.8	0.0	0.5	0.01	0.00	0.01
NM:SANTA FE	6		0.7	0.1	0.4	0.02	0.01	0.01
NV:LAS VEGAS	9		0.6	0.1	0.3	0.05	0.01	0.03
NY:ALBANY	4		0.1	0.0	0.1	0.02	0.01	0.01
NY:NEW YORK CITY	9		0.4	0.1	0.2	0.02	0.01	0.01

TABLE 2 (CONTINUED)

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
OCTOBER 1986

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m ³)			(pCi/m ³)		
NY:NIAGARA FALLS	9	0.1	0.0	0.1	0.02	0.00	0.01
NY:SYRACUSE	4	0.1	0.1	0.1	0.01	0.01	0.01
NY:YAPHANK	8	0.2	0.0	0.1	0.02	0.01	0.01
OH:COLUMBUS	9	1.0	0.0	0.3	0.03	0.00	0.01
OH:PAINESVILLE	9	0.3	0.0	0.1	0.03	0.00	0.01
OH:TOLEDO	9	0.7	0.1	0.2	0.03	0.01	0.02
OK:OKLAHOMA CITY	8	0.5	0.0	0.3	0.02	0.01	0.01
OR:PORTLAND	9	0.0	0.0	0.0	0.04	0.01	0.02
PA:GOLDSBORO	9	1.3	0.0	0.3	0.02	0.00	0.01
PA:HARRISBURG	9	0.8	0.1	0.3	0.02	0.00	0.01
PA:PITTSBURGH	9	0.0	0.0	0.0	0.02	0.00	0.01
PA:THREE MILE ISL	9	1.3	0.1	0.4	0.02	0.00	0.01
RI:PROVIDENCE	9	0.5	0.1	0.2	0.02	0.01	0.01
SC:BARNWELL	3	0.1	0.0	0.1	0.01	0.00	0.01
SC:COLUMBIA	9	0.8	0.0	0.4	0.05	0.01	0.02
SD:PIERRE	9	1.6	0.2	0.5	0.02	0.01	0.02
TN:KNOXVILLE	8	0.7	0.0	0.4	0.04	0.01	0.02
TN:NASHVILLE	9	1.6	0.1	0.6	0.05	0.01	0.02
TX:AUSTIN	8	0.3	0.0	0.1	0.02	0.00	0.01
TX:EL PASO	9	1.0	0.0	0.7	0.03	0.01	0.02
VA:LYNCHBURG	9	2.4	0.2	0.9	0.02	0.01	0.01
WA:OLYMPIA	9	0.4	0.0	0.2	0.02	0.00	0.01
WA:SPOKANE	9	1.1	0.3	0.6	0.05	0.00	0.02
WI:MADISON	7	0.6	0.1	0.3	0.03	0.01	0.01
WV:CHARLESTON	9	0.4	0.0	0.2	0.02	0.01	0.01
WY:CHEYENNE	3	1.2	0.2	0.5	0.01	0.01	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m³
 MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m³

TABLE 3
AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
NOVEMBER 1986

LOCATION	#	SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
			MAX	MIN	AVG	MAX	MIN	AVG
			(pCi/m ³)			(pCi/m ³)		
AL:ASHFORD	4		0.0	0.0	0.0	0.01	0.00	0.00
AL:MONTGOMERY	7		1.8	0.1	0.6	0.02	0.01	0.01
AR:LITTLE ROCK	7		0.6	0.1	0.2	0.03	0.01	0.02
AZ:PHOENIX	8		4.5	0.3	1.8	0.06	0.01	0.02
CA:LOS ANGELES	7		0.6	0.1	0.4	0.02	0.01	0.02
CO:DENVER	8		1.0	0.2	0.7	0.02	0.01	0.01
CT:HARTFORD	8		0.2	0.0	0.1	0.01	0.00	0.01
DE:WILMINGTON	6		0.2	0.0	0.1	0.01	0.00	0.01
FL:JACKSONVILLE	7		0.2	0.1	0.1	0.01	0.00	0.01
FL:MIAMI	7		0.0	0.0	0.0	0.01	0.00	0.00
GA:ATLANTA	4		0.0	0.0	0.0	0.02	0.01	0.01
HI:HONOLULU	8		0.2	0.1	0.1	0.01	0.00	0.00
IA:IOWA CITY	8		0.8	0.2	0.4	0.02	0.01	0.02
ID:BOISE	7		0.3	0.1	0.2	0.01	0.00	0.01
ID:IDAHO FALLS	8		0.0	0.0	0.0	0.02	0.00	0.01
IL:CHICAGO	6		0.7	0.0	0.2	0.02	0.01	0.01
IN:INDIANAPOLIS	7		2.8	0.1	0.7	0.07	0.01	0.03
KS:TOPEKA	7		1.2	0.3	0.7	0.03	0.01	0.02
KY:FRANKFORT	6		0.6	0.2	0.5	0.02	0.01	0.01
LA:NEW ORLEANS	3		0.1	0.0	0.0	0.01	0.01	0.01
MA:LAWRENCE	8		0.3	0.1	0.1	0.02	0.00	0.01
ME:AUGUSTA	5		0.2	0.0	0.1	0.01	0.01	0.01
MI:LANSING	8		0.3	0.1	0.2	0.02	0.01	0.01
MN:MINNEAPOLIS	7		0.9	0.1	0.3	0.03	0.01	0.02
MO:JEFFERSON CITY	7		0.6	0.2	0.3	0.05	0.01	0.02
MS:JACKSON	8		0.4	0.0	0.2	0.02	0.01	0.01
NC:CHARLOTTE	8		0.3	0.1	0.1	0.02	0.01	0.01
NC:WILMINGTON	7		0.0	0.0	0.0	0.01	0.01	0.01
ND:BISMARCK	6		0.3	0.1	0.2	0.03	0.01	0.02
NE:LINCOLN	4		0.6	0.2	0.3	0.05	0.01	0.02
NH:CONCORD	8		0.1	0.0	0.1	0.01	0.00	0.01
NJ:TRENTON	8		0.4	0.1	0.2	0.01	0.00	0.01
NM:SANTA FE	4		0.4	0.1	0.2	0.01	0.01	0.01
NV:LAS VEGAS	8		0.3	0.1	0.2	0.05	0.01	0.02
NY:ALBANY	4		0.0	0.0	0.0	0.02	0.01	0.01
NY:NEW YORK CITY	8		0.2	0.0	0.1	0.02	0.01	0.01
NY:NIAGARA FALLS	7		0.9	0.1	0.2	0.02	0.01	0.01

TABLE 3 (CONTINUED)

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
NOVEMBER 1986

LOCATION	#	SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
			MAX	MIN	AVG	MAX	MIN	AVG
			(pCi/m ³)			(pCi/m ³)		
NY:SYRACUSE	4		0.1	0.0	0.1	0.01	0.01	0.01
NY:YAPHANK	7		0.1	0.0	0.0	0.01	0.00	0.01
OH:COLUMBUS	8		0.3	0.0	0.1	0.02	0.01	0.01
OH:PAINESVILLE	8		0.2	0.1	0.1	0.02	0.01	0.01
OH:TOLEDO	8		0.9	0.2	0.4	0.03	0.01	0.02
OK:OKLAHOMA CITY	6		0.5	0.1	0.3	0.05	0.01	0.02
OR:PORTLAND	8		0.0	0.0	0.0	0.02	0.00	0.01
PA:GOLDSBORO	8		0.1	0.0	0.0	0.01	0.01	0.01
PA:HARRISBURG	8		0.3	0.1	0.1	0.02	0.01	0.01
PA:PITTSBURGH	8		0.1	0.1	0.1	0.02	0.01	0.01
PA:THREE MILE ISL	6		0.4	0.0	0.2	0.02	0.01	0.01
RI:PROVIDENCE	6		0.3	0.1	0.2	0.02	0.00	0.01
SC:BARNWELL	1		0.0	0.0	0.0	0.01	0.01	0.01
SC:COLUMBIA	6		0.2	0.1	0.1	0.02	0.01	0.01
SD:PIERRE	6		0.6	0.1	0.3	0.03	0.01	0.02
TN:KNOXVILLE	7		0.1	0.0	0.1	0.02	0.00	0.01
TN:NASHVILLE	8		1.9	0.1	0.5	0.03	0.01	0.02
TX:AUSTIN	8		0.3	0.1	0.2	0.02	0.00	0.01
TX:EL PASO	7		1.0	0.2	0.6	0.03	0.01	0.02
VA:LYNCHBURG	8		0.4	0.1	0.3	0.01	0.01	0.01
WA:OLYMPIA	7		0.1	0.0	0.0	0.01	0.00	0.01
WA:SPOKANE	9		0.8	0.1	0.2	0.02	0.00	0.01
WI:MADISON	8		0.6	0.1	0.3	0.02	0.01	0.01
WV:CHARLESTON	7		0.2	0.1	0.1	0.02	0.00	0.01
WY:CHEYENNE	4		0.2	0.0	0.1	0.01	0.00	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m³
 MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m³

TABLE 4
AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
DECEMBER 1986

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m ³)			(pCi/m ³)		
AL:ASHFORD	3	0.0	0.0	0.0	0.00	0.00	0.00
AL:MONTGOMERY	8	0.9	0.1	0.3	0.01	0.01	0.01
AR:LITTLE ROCK	9	0.3	0.1	0.2	0.03	0.01	0.02
AZ:PHOENIX	9	2.6	0.2	1.2	0.06	0.01	0.02
CA:LOS ANGELES	10	0.8	0.1	0.4	0.03	0.01	0.02
CO:DENVER	10	0.7	0.3	0.4	0.02	0.01	0.01
CT:HARTFORD	9	0.1	0.0	0.1	0.01	0.01	0.01
DE:WILMINGTON	7	0.1	0.0	0.1	0.02	0.00	0.01
FL:JACKSONVILLE	8	0.1	0.0	0.1	0.01	0.00	0.01
FL:MIAMI	9	0.0	0.0	0.0	0.01	0.00	0.01
GA:ATLANTA	4	0.0	0.0	0.0	0.01	0.01	0.01
HI:HONOLULU	8	0.2	0.1	0.2	0.01	0.00	0.00
IA:IOWA CITY	8	0.4	0.1	0.3	0.02	0.01	0.02
ID:BOISE	9	1.4	0.2	0.5	0.05	0.01	0.03
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.04	0.01	0.02
IL:CHICAGO	6	0.4	0.1	0.3	0.05	0.01	0.03
IN:INDIANAPOLIS	4	0.2	0.1	0.2	0.02	0.01	0.01
KS:TOPEKA	8	0.6	0.2	0.4	0.02	0.01	0.01
KY:FRANKFORT	6	0.5	0.1	0.4	0.02	0.01	0.01
LA:NEW ORLEANS	3	0.0	0.0	0.0	0.01	0.01	0.01
MA:LAWRENCE	9	0.2	0.0	0.1	0.01	0.00	0.01
ME:AUGUSTA	7	0.1	0.0	0.1	0.03	0.00	0.01
MI:LANSING	9	0.2	0.1	0.1	0.03	0.00	0.01
MN:MINNEAPOLIS	9	0.7	0.0	0.3	0.02	0.01	0.02
MO:JEFFERSON CITY	8	0.7	0.1	0.3	0.02	0.01	0.01
MS:JACKSON	8	0.1	0.0	0.1	0.02	0.01	0.01
NC:CHARLOTTE	9	0.4	0.1	0.2	0.05	0.01	0.02
NC:WILMINGTON	5	0.0	0.0	0.0	0.02	0.01	0.01
ND:BISMARCK	8	0.4	0.1	0.3	0.02	0.01	0.01
NE:LINCOLN	8	0.7	0.3	0.5	0.02	0.01	0.02
NH:CONCORD	8	0.1	0.0	0.0	0.01	0.00	0.01
NJ:TRENTON	9	0.3	0.0	0.1	0.02	0.00	0.01
NM:SANTA FE	7	0.2	0.1	0.1	0.03	0.01	0.02
NV:LAS VEGAS	10	0.7	0.1	0.4	0.04	0.01	0.03
NY:ALBANY	5	0.0	0.0	0.0	0.02	0.01	0.02
NY:NEW YORK CITY	9	0.2	0.0	0.1	0.02	0.01	0.01
NY:NIAGARA FALLS	9	0.3	0.0	0.1	0.02	0.01	0.01

TABLE 4 (CONTINUED)

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
DECEMBER 1986

LOCATION	#	SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
			MAX	MIN	AVG	MAX	MIN	AVG
			(pCi/m ³)			(pCi/m ³)		
NY:SYRACUSE		3	0.1	0.0	0.0	0.01	0.01	0.01
NY:YAPHANK		7	0.1	0.0	0.1	0.01	0.00	0.01
OH:COLUMBUS		8	0.3	0.0	0.1	0.03	0.01	0.02
OH:PAINESVILLE		9	0.1	0.1	0.1	0.02	0.00	0.01
OH:TOLEDO		9	0.7	0.0	0.3	0.06	0.01	0.02
OK:OKLAHOMA CITY		8	0.5	0.2	0.3	0.03	0.01	0.02
OR:PORTLAND		9	0.0	0.0	0.0	0.02	0.00	0.01
PA:GOLDSBORO		10	0.6	0.0	0.2	0.02	0.00	0.01
PA:HARRISBURG		9	0.2	0.0	0.1	0.02	0.00	0.01
PA:PITTSBURGH		9	0.1	0.1	0.1	0.02	0.00	0.01
PA:THREE MILE ISL		10	0.4	0.0	0.1	0.02	0.01	0.01
RI:PROVIDENCE		9	0.1	0.1	0.1	0.01	0.01	0.01
SC:BARNWELL		2	0.0	0.0	0.0	0.01	0.00	0.00
SC:COLUMBIA		7	0.3	0.1	0.2	0.04	0.01	0.02
SD:PIERRE		8	0.8	0.1	0.5	0.02	0.01	0.01
TN:KNOXVILLE		8	0.3	0.0	0.2	0.04	0.01	0.02
TN:NASHVILLE		8	0.3	0.1	0.2	0.02	0.01	0.01
TX:AUSTIN		8	0.3	0.0	0.1	0.02	0.01	0.01
TX:EL PASO		8	1.2	0.1	0.5	0.03	0.01	0.02
VA:LYNCHBURG		6	0.5	0.1	0.3	0.02	0.00	0.01
WA:OLYMPIA		9	0.2	0.0	0.1	0.01	0.00	0.01
WA:SPOKANE		9	0.1	0.1	0.1	0.03	0.01	0.02
WI:MADISON		6	0.2	0.1	0.1	0.02	0.01	0.02
WV:CHARLESTON		6	0.3	0.1	0.2	0.02	0.01	0.01
WY:CHEYENNE		5	0.2	0.1	0.2	0.01	0.01	0.01
MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES			- .1 pCi/m ³					
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT			- .01 pCi/m ³					

TABLE 5

GROSS BETA CONCENTRATION IN PRECIPITATION

OCTOBER 1986

LOCATION	DEPTH (mm)	ACT. $\pm$ 2s (nCi/m ²)		SPECIFIC GAMMA ACT.
AL:MONTGOMERY	82.0	0.09	0.04	ND
AR:LITTLE ROCK	123.0	0.06	0.05	ND
CO:DENVER	1.0	0.02	0.01	ND
CT:HARTFORD	50.0	0.05	0.02	ND
DE:WILMINGTON	75.0	0.39	0.05	ND
FL:JACKSONVILLE	41.2	0.09	0.02	ND
FL:MIAMI	58.0	0.08	0.03	ND
ID:BOISE	37.0	0.06	0.02	ND
ID:IDAHO FALLS	41.4	0.08	0.02	ND
IL:CHICAGO	116.1	0.04	0.06	ND
IN:INDIANAPOLIS	42.0	0.01	0.02	ND
LA:NEW ORLEANS	73.0	0.04	0.03	ND
ME:AUGUSTA	33.0	0.10	0.02	ND
MI:LANSING	115.8	0.09	0.05	ND
MN:MINNEAPOLIS	25.2	0.02	0.01	ND
MO:JEFFERSON CITY	2.0	0.00	0.01	ND
MS:JACKSON	124.4	0.15	0.06	ND
NC:CHARLOTTE	90.0	0.12	0.04	ND
NC:WILMINGTON	73.0	0.09	0.04	ND
ND:BISMARCK	7.6	0.01	0.01	ND
NH:CONCORD	49.0	0.14	0.03	ND
NJ:TRENTON	19.2	0.02	0.01	ND
NY:ALBANY	89.0	0.07	0.04	ND
NY:NEW YORK CITY	24.4	0.02	0.01	ND
NY:NIAGARA FALLS	77.0	0.05	0.03	ND
NY:SYRACUSE	43.4	0.08	0.02	ND
NY:YAPHANK	97.0	0.18	0.05	ND
OH:COLUMBUS	96.6	0.06	0.04	ND
OH:PAINESVILLE	116.0	0.16	0.06	ND
OH:TOLEDO	136.0	0.05	0.06	ND
OK:OKLAHOMA CITY	61.0	0.04	0.03	ND
OR:PORTLAND	36.2	0.04	0.02	ND
PA:HARRISBURG	37.0	0.09	0.02	ND
PA:MIDDLETOWN	96.0	0.11	0.04	ND
PA:PITTSBURGH	118.6	0.32	0.07	ND
RI:PROVIDENCE	58.0	0.14	0.03	ND
SC:BARNWELL	51.8	0.05	0.02	ND
SC:COLUMBIA	134.2	0.01	0.06	ND
SD:PIERRE	37.8	0.04	0.02	ND
TN:KNOXVILLE	81.0	0.02	0.03	ND
TN:NASHVILLE	97.0	0.06	0.04	ND
TX:AUSTIN	34.0	0.02	0.02	ND
WA:OLYMPIA	89.0	0.09	0.05	ND
WI:MADISON	58.0	0.02	0.03	ND
WV:CHARLESTON	23.6	0.04	0.01	ND

s = SIGMA COUNTING ERROR

TABLE 6

GROSS BETA CONCENTRATION IN PRECIPITATION

LOCATION	DEPTH (mm)	NOVEMBER 1986 ACT. $\pm$ 2s (nCi/m ²)		SPECIFIC GAMMA ACT.
AL:MONTGOMERY	102.0	0.11	0.05	ND
AR:LITTLE ROCK	91.0	0.07	0.04	ND
AZ:PHOENIX	2.6	0.00	0.01	ND
CT:HARTFORD	149.2	0.20	0.07	ND
DE:WILMINGTON	63.0	0.18	0.04	ND
FL:JACKSONVILLE	21.0	0.11	0.02	ND
FL:MIAMI	63.2	0.03	0.03	ND
ID:BOISE	28.0	0.03	0.01	ND
ID:IDAHO FALLS	11.5	0.03	0.01	ND
IL:CHICAGO	53.4	0.03	0.02	ND
LA:NEW ORLEANS	4.0	0.00	0.01	ND
ME:AUGUSTA	40.0	0.03	0.02	ND
MI:LANSING	11.0	0.01	0.01	ND
MN:MINNEAPOLIS	14.6	0.10	0.01	ND
MO:JEFFERSON CITY	8.0	0.00	0.01	ND
MS:JACKSON	237.4	0.06	0.09	ND
NC:CHARLOTTE	100.0	0.12	0.05	ND
NC:WILMINGTON	90.0	0.04	0.03	ND
ND:BISMARCK	22.6	0.02	0.01	ND
NH:CONCORD	38.0	0.04	0.02	ND
NJ:TRENTON	35.0	0.03	0.02	ND
NV:LAS VEGAS	6.8	0.01	0.01	ND
NY:ALBANY	82.0	0.10	0.04	ND
NY:NEW YORK CITY	40.8	0.04	0.02	ND
NY:NIAGARA FALLS	36.8	0.05	0.02	ND
NY:SYRACUSE	68.0	0.03	0.03	ND
NY:YAPHANK	102.0	0.10	0.05	ND
OH:COLUMBUS	83.2	0.06	0.03	ND
OH:PAINESVILLE	42.0	0.06	0.02	ND
OH:TOLEDO	10.0	0.01	0.01	ND
OK:OKLAHOMA CITY	48.0	0.03	0.02	ND
OR:PORTLAND	92.0	0.09	0.04	ND
PA:HARRISBURG	120.0	0.12	0.06	ND
PA:MIDDLETOWN	110.0	0.08	0.05	ND
PA:PITTSBURGH	4.2	0.01	0.01	ND
RI:PROVIDENCE	78.0	0.10	0.04	ND
SC:BARNWELL	17.2	0.01	0.01	ND
SC:COLUMBIA	159.2	0.18	0.08	ND
TN:KNOXVILLE	42.0	0.05	0.02	ND
TN:NASHVILLE	47.4	0.02	0.02	ND
TX:AUSTIN	28.0	0.00	0.01	ND

TABLE 6 (CONTINUED)

GROSS BETA CONCENTRATION IN PRECIPITATION

LOCATION	NOVEMBER 1986			SPECIFIC GAMMA ACT.
	DEPTH	ACT.	$\pm$ 2s	
	(mm)	(nCi/m ²)		
TX:EL PASO	13.0	0.01	0.01	ND
VA:LYNCHBURG	56.6	0.07	0.03	ND
WA:OLYMPIA	117.0	0.06	0.05	ND
WI:MADISON	21.0	0.04	0.01	ND
WV:CHARLESTON	85.0	0.10	0.04	ND

s = SIGMA COUNTING ERROR

TABLE 7

GROSS BETA CONCENTRATION IN PRECIPITATION

LOCATION	DECEMBER 1986			SPECIFIC GAMMA ACT.
	DEPTH (mm)	ACT. (nCi/m ²)	$\pm$ 2s	
AL:MONTGOMERY	23.0	0.06	0.01	ND
AR:LITTLE ROCK	128.0	0.22	0.08	ND
CO:DENVER	4.0	0.02	0.01	ND
CT:HARTFORD	109.4	0.09	0.05	ND
FL:JACKSONVILLE	136.2	0.14	0.06	ND
FL:MIAMI	85.0	0.03	0.04	ND
IL:CHICAGO	32.2	0.03	0.01	ND
LA:NEW ORLEANS	65.0	0.04	0.03	ND
MI:LANSING	43.4	0.15	0.03	ND
MO:JEFFERSON CITY	16.0	0.02	0.01	ND
MS:JACKSON	123.2	0.08	0.05	ND
NC:CHARLOTTE	93.0	0.14	0.05	ND
NC:WILMINGTON	119.0	0.10	0.05	ND
NJ:TRENTON	119.3	0.06	0.05	ND
NV:LAS VEGAS	1.5	0.01	0.01	ND
NY:ALBANY	111.4	0.04	0.04	ND
NY:NEW YORK CITY	43.0	0.04	0.02	ND
NY:NIAGARA FALLS	93.4	0.05	0.04	ND
NY:SYRACUSE	42.0	0.04	0.02	ND
NY:YAPHANK	224.0	0.21	0.11	ND
OH:COLUMBUS	95.0	0.10	0.05	ND
OH:PAINESVILLE	87.0	0.16	0.04	ND
OK:OKLAHOMA CITY	58.0	0.04	0.02	ND
OR:PORTLAND	122.4	0.11	0.05	ND
PA:HARRISBURG	127.2	0.09	0.06	ND
PA:MIDDLETOWN	141.0	0.11	0.06	ND
RI:PROVIDENCE	63.0	0.04	0.03	ND
SC:BARNWELL	170.4	0.12	0.08	ND
SC:COLUMBIA	65.4	0.03	0.03	ND
TN:KNOXVILLE	42.0	0.03	0.02	ND
TN:NASHVILLE	64.0	0.10	0.03	ND
TX:AUSTIN	40.0	0.05	0.02	ND
TX:EL PASO	42.6	0.04	0.02	ND
VA:LYNCHBURG	92.8	0.34	0.06	ND
WA:OLYMPIA	181.0	0.19	0.08	ND
WI:MADISON	40.0	0.12	0.02	ND
WV:CHARLESTON	63.0	0.03	0.03	ND

s = SIGMA COUNTING ERROR

TABLE 8
PRECIPITATION
TRITIUM CONCENTRATION
OCTOBER - DECEMBER 1986

LOCATION	OCTOBER nCi/l $\pm$ 2s	NOVEMBER nCi/l $\pm$ 2s	DECEMBER nCi/l $\pm$ 2s
AL:MONTGOMERY	0.1 0.2	0.3 0.2	0.1 0.2
AR:LITTLE ROCK	0.5 0.2	0.2 0.2	0.2 0.2
AZ:PHOENIX	NS	0.2 0.2	NS
CO:DENVER	0.2 0.2	NS	0.1 0.2
CT:HARTFORD	0.2 0.2	0.1 0.2	0.1 0.2
DE:WILMINGTON	0.3 0.2	0.1 0.2	NS
FL:JACKSONVILLE	0.3 0.2	0.3 0.2	0.1 0.2
FL:MIAMI	0.2 0.2	0.1 0.2	0.1 0.2
ID:BOISE	0.2 0.2	0.2 0.2	NS
ID:IDAHO FALLS	0.1 0.2	0.2 0.2	NS
IL:CHICAGO	0.2 0.2	0.3 0.2	0.2 0.2
IN:INDIANAPOLIS	0.2 0.2	NS	NS
LA:NEW ORLEANS	0.5 0.2	0.2 0.2	0.2 0.2
ME:AUGUSTA	0.1 0.2	0.1 0.2	NS
MI:LANSING	0.3 0.2	0.3 0.2	0.2 0.2
MN:MINNEAPOLIS	0.1 0.2	0.1 0.2	NS
MO:JEFFERSON CITY	0.1 0.2	0.2 0.2	0.1 0.2
MS:JACKSON	0.2 0.2	0.1 0.2	0.1 0.2
NC:CHARLOTTE	0.5 0.2	0.2 0.2	0.2 0.2
NC:WILMINGTON	0.2 0.2	0.1 0.2	0.2 0.2
ND:BISMARCK	0.3 0.2	0.1 0.2	NS
NH:CONCORD	0.2 0.2	0.1 0.2	NS
NJ:TRENTON	0.3 0.2	0.1 0.2	0.2 0.2
NV:LAS VEGAS	NS	0.4 0.2	0.1 0.2
NY:ALBANY	0.3 0.2	0.2 0.2	0.1 0.2
NY:NEW YORK CITY	0.2 0.2	0.3 0.2	0.1 0.2
NY:NIAGARA FALLS	0.3 0.2	0.2 0.2	0.1 0.2
NY:SYRACUSE	0.2 0.2	0.1 0.2	0.1 0.2
NY:YAPHANK	0.2 0.2	0.1 0.2	0.1 0.2
OH:COLUMBUS	0.1 0.2	0.1 0.2	0.2 0.2
OH:PAINESVILLE	0.2 0.2	0.1 0.2	0.1 0.2
OH:TOLEDO	0.1 0.2	0.3 0.2	NS
OK:OKLAHOMA CITY	0.1 0.2	0.3 0.2	0.1 0.2
OR:PORTLAND	0.1 0.2	0.3 0.2	0.1 0.2
PA:HARRISBURG	0.3 0.2	0.2 0.2	0.2 0.2
PA:MIDDLETOWN	0.3 0.2	0.2 0.2	0.2 0.2
PA:PITTSBURGH	0.3 0.2	0.2 0.2	NS
RI:PROVIDENCE	0.2 0.2	0.1 0.2	0.1 0.2
SC:BARNWELL	0.7 0.2	0.1 0.2	1.8 0.2

TABLE 8 (CONTINUED)

PRECIPITATION
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1986

LOCATION	OCTOBER	NOVEMBER	DECEMBER
	nCi/l $\pm$ 2s	nCi/l $\pm$ 2s	nCi/l $\pm$ 2s
SC:COLUMBIA	0.3 0.2	0.3 0.2	0.2 0.2
SD:PIERRE	0.2 0.2	NS	NS
TN:KNOXVILLE	0.4 0.2	0.2 0.2	0.2 0.2
TN:NASHVILLE	0.1 0.2	0.1 0.2	0.2 0.2
TX:AUSTIN	0.2 0.2	0.1 0.2	0.1 0.2
TX:EL PASO	NS	0.3 0.2	0.1 0.2
VA:LYNCHBURG	NS	0.3 0.2	0.1 0.2
WA:OLYMPIA	0.2 0.2	0.4 0.2	0.1 0.2
WI:MADISON	0.2 0.2	0.2 0.2	0.1 0.2
WV:CHARLESTON	0.2 0.2	0.1 0.2	0.1 0.2

NS = NO SAMPLE

s = SIGMA COUNTING ERROR

Plutonium and Uranium in Airborne Particulates and Precipitation

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.

The plutonium and uranium results for the period July - December 1986 are shown in Table 9.

TABLE 9

PLUTONIUM AND URANIUM IN AIRBORNE PARTICULATES
JULY - DECEMBER 1986 COMPOSITES

	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
LOCATION	$\text{aCi/m}^3 \pm 2\text{s}$		$\text{aCi/m}^3 \pm 2\text{s}$		$\text{aCi/m}^3 \pm 2\text{s}$		$\text{aCi/m}^3 \pm 2\text{s}$		$\text{aCi/m}^3 \pm 2\text{s}$	
AL:ASHFORD	0.2	0.5	0.3	0.5	16.2	3.2	0.3	0.6	15.8	3.1
AL:MONTGOMERY	0.0	0.3	0.1	0.2	15.5	2.9	0.3	0.3	15.6	2.9
AR:LITTLE ROCK	0.7	1.1	0.5	0.4	25.9	4.1	2.7	1.2	21.9	3.7
AZ:PHOENIX	1.3	1.8	0.4	0.6	47.2	7.7	4.0	1.8	38.0	6.6
CA:BERKELEY	0.6	0.7	0.7	0.5	9.1	3.0	0.0	0.6	7.7	2.8
CA:LOS ANGELES	0.0	0.9	0.0	0.9	29.7	6.7	0.5	1.5	25.5	5.8
CO:DENVER	2.1	1.3	0.7	0.6	32.2	5.3	1.1	0.9	30.0	5.0
CT:HARTFORD	0.4	0.7	0.3	0.3	16.1	3.2	0.0	0.0	9.7	2.4
DE:WILMINGTON	0.5	0.7	0.1	0.2	10.6	1.8	0.2	0.3	9.3	1.6
FL:JACKSONVILLE	0.6	0.9	0.8	0.6	18.1	3.4	0.6	0.5	17.9	3.3
FL:MIAMI	0.3	0.4	0.3	0.3	20.3	3.6	0.7	0.6	16.1	3.1
GA:ATLANTA	0.4	0.7	0.1	0.6	31.5	5.6	2.5	1.3	29.2	5.3
HI:HONOLULU	0.4	0.6	0.0	0.4	7.4	2.4	0.0	0.3	6.5	2.0
IA:IOWA CITY	0.1	0.8	-0.4	0.6	19.5	3.6	0.8	0.8	14.5	3.0
ID:BOISE	-0.4	1.4	0.5	1.0	26.8	4.5	1.5	0.9	24.5	4.2
ID:IDAHO FALLS	0.4	0.6	0.3	0.3	26.6	4.3	0.6	0.6	21.2	3.7
IL:CHICAGO	-0.1	1.3	0.2	0.8	30.1	5.2	0.4	0.8	27.8	4.9
IN:INDIANAPOLIS	-0.1	1.0	0.3	0.6	33.5	5.9	1.5	1.0	34.1	5.9
KS:TOPEKA	0.4	0.5	0.1	0.3	12.9	1.8	0.4	0.3	10.0	1.5
KY:FRANKFORT	0.2	0.5	0.1	0.3	7.3	2.2	0.2	0.5	7.5	2.2
LA:NEW ORLEANS	0.4	0.5	0.0	0.2	17.1	2.7	0.3	0.4	16.0	2.6
MA:LAWRENCE	0.5	0.5	0.2	0.3	18.5	3.2	0.6	0.6	18.8	3.2
ME:AUGUSTA	0.8	0.7	0.2	0.4	20.0	3.9	0.7	0.9	21.8	4.1
MI:LANSING	0.3	0.3	0.0	0.2	11.6	2.5	0.6	0.6	12.6	2.5
MN:MINNEAPOLIS	0.6	0.7	0.3	0.5	16.4	3.7	1.1	0.8	17.0	3.6
MO:JEFFERSON CITY	0.3	0.4	0.0	0.3	12.8	2.4	0.4	0.4	12.4	2.3
MS:JACKSON	0.3	0.4	0.1	0.3	17.4	3.1	0.2	0.3	16.7	3.0
NC:CHARLOTTE	0.4	0.3	0.3	0.2	17.0	2.4	0.7	0.4	14.1	2.1
NC:WILMINGTON	0.2	0.3	1.4	0.8	14.2	2.2	0.3	0.3	13.4	2.1
ND:BISMARCK	-0.2	0.4	0.2	0.4	26.3	5.7	1.1	1.0	23.1	5.3
NE:LINCOLN	0.2	1.1	0.1	0.2	27.8	5.3	0.6	0.7	29.0	5.4
NH:CONCORD	0.3	0.3	0.0	0.1	9.9	1.9	0.1	0.2	9.2	1.8
NJ:TRENTON	0.0	0.4	0.0	0.1	7.6	1.6	0.0	0.2	11.4	2.0
NM:SANTA FE	0.2	0.5	0.1	0.2	15.4	2.9	0.8	0.5	13.6	2.6
NV:LAS VEGAS	0.6	1.9	0.6	0.8	124.5	23.6	5.3	3.6	69.3	15.0
NY:ALBANY	0.5	0.7	-0.1	0.4	25.7	4.7	1.2	0.8	25.1	4.5
NY:NEW YORK CITY	0.2	0.6	0.1	0.3	16.2	3.4	0.2	0.5	17.6	3.5
NY:NIAGARA FALLS	0.7	0.8	-0.3	0.5	23.2	3.3	2.1	0.8	24.1	3.4
NY:SYRACUSE	0.3	0.5	0.1	0.4	13.7	2.3	0.6	0.4	11.3	2.0
NY:YAPHANK	0.2	0.4	0.4	0.3	4.5	1.0	0.2	0.2	4.7	1.0
OH:COLUMBUS	0.8	1.1	0.6	0.5	23.0	3.8	1.2	0.8	26.1	4.1

TABLE 9 (CONTINUED)

PLUTONIUM AND URANIUM IN AIRBORNE PARTICULATES
JULY - DECEMBER 1986 COMPOSITES

	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
LOCATION	$\text{aCi/m}^3 \pm 2s$		$\text{aCi/m}^3 \pm 2s$		$\text{aCi/m}^3 \pm 2s$		$\text{aCi/m}^3 \pm 2s$		$\text{aCi/m}^3 \pm 2s$	
OH:PAINESVILLE	0.2	0.4	1.0	0.6	16.7	2.6	0.3	0.3	17.5	2.6
OH:TOLEDO	0.5	0.8	0.6	0.5	26.7	4.6	1.4	0.8	26.5	4.6
OK:OKLAHOMA CITY	1.4	1.2	0.4	0.6	26.8	4.9	0.3	0.6	23.5	4.5
OR:PORTLAND	-0.2	0.8	0.7	0.8	17.8	2.4	1.8	0.6	14.2	1.9
PA:GOLDSBORO	-0.1	0.5	0.2	0.3	8.6	1.7	0.4	0.3	8.4	1.6
PA:HARRISBURG	0.7	0.7	0.2	0.6	10.4	2.2	-0.1	0.1	7.7	1.8
PA:PITTSBURGH	0.4	0.7	0.1	0.2	20.5	3.7	0.8	0.9	20.3	3.6
PA:THREE MILE ISL	0.7	0.5	0.1	0.2	9.8	2.0	0.3	0.4	8.5	1.7
RI:PROVIDENCE	1.1	0.6	0.3	0.4	14.8	3.0	0.8	0.8	12.1	2.7
SC:BARNWELL	1.2	0.9	0.8	0.7	17.6	3.1	0.6	0.5	17.3	3.1
SC:COLUMBIA	0.3	0.7	0.4	0.5	33.7	5.4	0.7	0.6	33.4	5.2
SD:PIERRE	-0.1	0.7	0.2	0.4	17.5	3.4	0.5	0.5	17.3	3.4
TN:KNOXVILLE	0.6	0.5	0.2	0.2	34.4	4.3	1.9	0.7	19.4	2.8
TN:NASHVILLE	0.3	0.3	0.2	0.2	22.0	3.3	0.5	0.5	20.8	3.2
TX:AUSTIN	-0.2	0.8	0.2	0.3	16.4	3.4	1.1	0.7	13.9	2.9
TX:EL PASO	0.6	1.0	0.8	0.7	58.8	8.5	2.2	1.2	43.1	6.8
VA:LYNCHBURG	0.0	0.3	0.4	0.3	85.4	9.1	1.7	0.7	12.0	1.9
WA:OLYMPIA	0.5	0.3	0.2	0.2	5.9	1.2	0.3	0.3	6.7	1.2
WA:SPOKANE	2.6	1.6	0.6	0.7	23.9	5.2	0.6	1.0	22.0	4.8
WI:MADISON	0.3	0.3	0.2	0.2	11.7	2.1	0.8	0.4	10.9	2.0
WV:CHARLESTON	0.0	0.6	0.4	0.5	22.8	3.9	1.3	0.9	21.1	3.7
WY:CHEYENNE	0.0	0.3	0.5	0.3	8.9	1.3	0.3	0.2	8.8	1.3

s = SIGMA COUNTING ERROR

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 annually 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.

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.

Tritium concentrations for October - December are shown in Table 10.

Results from the 1986 annual gamma analyses of surface water are shown in Table 11.

TABLE 10
SURFACE WATER
TRITIUM CONCENTRATION
OCTOBER - DECEMBER 1986

LOCATION	SOURCE	DATE COLLECTED	nCi/l	+ 2s
AL:DECATUR	TENNESSEE RIVER	10/ 6/86	0.2	0.2
AL:GORDON	CHATTAHOOCHEE R.	10/ 1/86	1.9	0.2
AL:SCOTTSBORO	TENNESSEE RIVER	10/ 7/86	0.2	0.2
CA:DIABLO CANYON	PACIFIC OCEAN	10/ 9/86	0.2	0.2
CA:EUREKA	HUMBOLDT BAY	10/ 2/86	0.1	0.2
CA:SAN ONOFRE	PACIFIC OCEAN	12/ 9/86	0.2	0.2
CO:GREELEY	SOUTH PLATTE RIVER	11/ 4/86	0.1	0.2
CT:EAST HADDAM	CONNECTICUT RIVER	12/17/86	0.3	0.2
CT:WATERFORD	LONG ISLAND SOUND	12/17/86	0.3	0.2
FL:CRYSTAL RIVER	GULF OF MEXICO	10/ 2/86	0.2	0.2
FL:FT. PIERCE	ATLANTIC OCEAN	10/ 7/86	0.2	0.2
FL:HOMESTEAD	BISCAYNE BAY	11/25/86	0.1	0.2
IA:CEDAR RAPIDS	CEDAR RIVER	10/ 8/86	0.2	0.2
ID:BUHL	SNAKE RIVER	10/20/86	0.4	0.2
IL:MORRIS	ILLINOIS RIVER	10/10/86	0.3	0.2
IL:ZION	LAKE MICHIGAN	11/15/86	0.1	0.2
KS:LE ROY	NEOSHO RIVER	12/30/86	0.2	0.2
LA:NEW ORLEANS	MISSISSIPPI RIVER	10/ 5/86	0.2	0.2
MA:PLYMOUTH	CAPE COD BAY	10/ 1/86	0.1	0.2
MD:CONOWINGO	SUSQUEHANNA RIVER	10/21/86	0.2	0.2
MD:LUSBY	CHESAPEAKE BAY	10/ 7/86	0.1	0.2
ME:WISCASSET	MONTSEWAY BAY	10/ 7/86	0.2	0.2
MI:BRIDGMAN	LAKE MICHIGAN	10/ 6/86	0.2	0.2
MI:CHARLEVOIX	LAKE MICHIGAN	10/ 2/86	0.2	0.2
MI:MONROE	LAKE ERIE	10/ 6/86	0.3	0.2
MI:SO. HAVEN	LAKE MICHIGAN	10/ 6/86	0.3	0.2
MN:MONTICELLO	MISSISSIPPI RIVER	10/ 2/86	0.2	0.2
MN:RED WING	MISSISSIPPI RIVER	10/14/86	0.2	0.2
MS:PORT GIBSON	MISSISSIPPI RIVER	10/21/86	0.1	0.2
NC:CHARLOTTE	CATAWBA RIVER	10/ 9/86	0.8	0.2
NC:SOUTHPORT	ATLANTIC OCEAN	10/10/86	0.2	0.2
NE:RULO	MISSOURI RIVER	10/28/86	0.3	0.2
NJ:BAYSIDE	DELAWARE RIVER	10/ 8/86	0.2	0.2
NJ:OYSTER CREEK	OYSTER CREEK	10/23/86	0.1	0.2
NV:BOULDER CITY	COLORADO RIVER	11/ 4/86	0.1	0.2
NY:CHELSEA	HUDSON RIVER	10/14/86	0.1	0.2
NY:OSSINING	HUDSON RIVER	10/ 6/86	0.2	0.2
NY:OSWEGO	LAKE ONTARIO	12/31/86	0.2	0.2
OR:BRADWOOD	COLUMBIA RIVER	10/22/86	0.1	0.2
PA:DANVILLE	SUSQUEHANNA RIVER	10/ 8/86	0.2	0.2

TABLE 10 (CONTINUED)

SURFACE WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1986

LOCATION	SOURCE	DATE COLLECTED	nCi/l	<u>+</u> 2s
SC:ALLENDAL	SAVANNAH RIVER	10/30/86	3.6	0.3
SC:BROAD RIVER	BROAD RIVER	10/29/86	0.5	0.2
SC:HARTSVILLE	LAKE ROBINSON	10/13/86	2.5	0.2
TN:DAISY	TENNESSEE RIVER	11/12/86	0.3	0.2
TN:KINGSTON	CLINCH RIVER	10/21/86	0.3	0.2
TN:KINGSTON	CLINCH RIVER	11/18/86	0.1	0.2
TN:KINGSTON	CLINCH RIVER	12/16/86	2.5	0.2
TN:KINGSTON	CLINCH RIVER	10/12/86	0.2	0.2
TX:EL PASO	RIO GRANDE	12/11/86	0.2	0.2
TX:MATAGORDA	COLORADO RIVER	10/15/86	0.1	0.2
VA:DOSWELL	NORTH ANNA RIVER	10/ 2/86	4.1	0.3
VA:NEWPORT NEWS	JAMES RIVER	10/ 6/86	0.5	0.2
WA:NORTHPORT	COLUMBIA RIVER	11/18/86	0.2	0.2
WA:RICHLAND	COLUMBIA RIVER	10/ 6/86	0.3	0.2
WI:TWO CREEKS	LAKE MICHIGAN	10/ 7/86	0.3	0.2
WI:VICTORY	MISSISSIPPI RIVER	10/14/86	0.2	0.2

s = SIGMA COUNTING ERROR

TABLE 11
SURFACE WATER
ANNUAL GAMMA ANALYSIS

1986

LOCATION	SOURCE	DATE COLLECTED	GAMMA pCi/l $\pm$ 2s
AL:DECATUR	TENNESSEE RIVER	4/ 8/86	ND
AL:GORDAN	CHATTahooCHEE R.	4/ 1/86	ND
AL:SCOTTSBORO	TENNESSEE RIVER	4/ 9/86	ND
AR:LITTLE ROCK	ARKANSAS RIVER	4/ 1/86	ND
CA:DIABLO CANYON	PACIFIC OCEAN	4/11/86	ND
CA:EUREKA	HUMBOLDT BAY	4/15/86	^{40}K 293 $\pm$ 37%
CA:SAN ONOFRE	PACIFIC OCEAN	6/19/86	^{40}K 248 $\pm$ 35%
CO:GREELEY	SOUTH PLATTE RIVER	4/ 8/86	ND
CT:EAST HADDAM	CONNECTICUT RIVER	5/29/86	ND
CT:WATERFORD	LONG ISLAND SOUND	5/29/86	^{40}K 372 $\pm$ 51%
FL:CRYSTAL RIVER	GULF OF MEXICO	4/ 7/86	ND
FL:FORT PIERCE	ATLANTIC OCEAN	4/22/86	ND
FL:HOMESTEAD	BISCAYNE BAY	4/15/86	ND
GA:CEDAR RAPIDS	CEDAR RIVER	4/ 9/86	ND
ID:BUHL	SNAKE RIVER	4/28/86	ND
IL:E. MOLINE	MISSISSIPPI RIVER	5/15/86	ND
IL:MORRIS	ILLINOIS RIVER	4/15/86	ND
IL:ZION	LAKE MICHIGAN	5/15/86	ND
IS:LE ROY	NEOSHO RIVER	7/29/86	ND
LA:NEW ORLEANS	MISSISSIPPI RIVER	4/10/86	ND
LA:PLYMOUTH	CAPE COD BAY	4/ 7/86	ND
MD:CONOWINGO	SUSQUEHANNA RIVER	4/15/86	ND
MD:LUSBY	CHESAPEAKE BAY	4/ 8/86	ND
ME:WISCASSET	MONTSEWAY BAY	4/ 8/86	^{40}K 119+ 71%
MI:BRIDGMAN	LAKE MICHIGAN	4/14/86	ND
MI:CHARLEVOIX	LAKE MICHIGAN	4/12/86	ND
MI:MONROE	LAKE ERIE	4/ 6/86	ND
MI:SO. HAVEN	LAKE MICHIGAN	4/14/86	ND
IN:MONTICELLO	MISSISSIPPI RIVER	4/ 9/86	ND
IN:RED WING	MISSISSIPPI RIVER	5/20/86	ND
IS:PORT GIBSON	MISSISSIPPI RIVER	4/17/86	ND
NC:CHARLOTTE	CATAWBA RIVER	4/ 7/86	ND
NC:SOUTHPORT	ATLANTIC OCEAN	4/11/86	^{40}K 201+ 48%
NE:RULO	MISSOURI RIVER	4/15/86	ND
NJ:BAYSIDE	DELAWARE RIVER	4/16/86	^{40}K 239+ 79%
NJ:OYSTER CREEK	OYSTER CREEK	5/21/86	ND
CO:BOULDER CITY	COLORADO RIVER	4/ 8/86	ND
NY:CHELSEA	HUDSON RIVER	4/10/86	ND

TABLE 11 (CONTINUED)

SURFACE WATER
ANNUAL GAMMA ANALYSIS

1986

LOCATION	SOURCE	DATE COLLECTED	GAMMA pCi/l $\pm$ 2s
NY:OSSINING	HUDSON RIVER	4/16/86	ND
OH:TOLEDO	LAKE ERIE	4/ 1/86	ND
PA:DANVILLE	SUSQUEHANNA RIVER	4/22/86	ND
SC:ALLENDAL	SAVANNAH RIVER	5/ 1/86	ND
SC:BROAD RIVER	BROAD RIVER	4/30/86	ND
SC:HARTSVILLE	LAKE ROBINSON	4/14/86	ND
TN:DAISY	TENNESSEE RIVER	5/20/86	ND
TN:KINGSTON	CLINCH RIVER	4/15/86	ND
TX:EL PASO	RIO GRANDE	4/29/86	ND
TX:MATAGORDA	COLORADO RIVER	4/ 9/86	ND
VA:NEWPORT NEWS	JAMES RIVER	5/ 7/86	ND
WA:NORTHPORT	COLUMBIA RIVER	5/20/86	ND
WA:RICHLAND	COLUMBIA RIVER	4/ 7/86	ND
WI:TWO CREEKS	LAKE MICHIGAN	5/16/86	ND
WI:VICTORY	MISSISSIPPI RIVER	4/ 7/86	ND
WV:WHEELING	OHIO RIVER	6/ 3/86	ND

ND = NO GAMMA ACTIVITY DETECTABLE

s = 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, -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.

The results of tritium in drinking water analyses for October - December are shown in Table 12.

Plutonium and uranium analyses are similar to procedures given for air particulate samples. Analyses were altered to coincide with revised EPA standards. The results of 1986 composites are shown in Table 13.

Iodine-131 concentration in drinking water for 1985 and 1986 is shown in Tables 14 and 15 respectively.

TABLE 12
 DRINKING WATER
 TRITIUM CONCENTRATION
 OCTOBER - DECEMBER 1986

LOCATION	DATE COLLECTED	nCi/l	<u>+</u>	2s
AK:FAIRBANKS	10/ 9/86	0.0		0.2
AL:DOTHAN	10/ 1/86	0.2		0.2
AL:MONTGOMERY	10/ 9/86	0.1		0.2
AL:MUSCLE SHOALS	10/ 6/86	0.2		0.2
AL:SCOTTSBORO	10/ 7/86	0.2		0.2
CA:BERKELEY	10/ 1/86	0.3		0.2
CA:LOS ANGELES	10/ 3/86	0.1		0.2
CO:DENVER	10/ 6/86	0.1		0.2
CO:PLATTEVILLE	10/ 8/86	0.2		0.2
CT:HARTFORD	9/29/86	0.3		0.2
DC:WASHINGTON	10/ 6/86	0.1		0.2
DE:DOVER	10/ 1/86	0.1		0.2
FL:MIAMI	10/ 1/86	0.4		0.2
FL:TAMPA	10/ 6/86	0.1		0.2
GA:SAVANNAH	10/ 6/86	2.5		0.2
HI:HONOLULU	10/20/86	0.2		0.2
IA:CEDAR RAPIDS	10/ 1/86	0.2		0.2
ID:BOISE	12/30/86	0.1		0.2
ID:IDAHO FALLS	11/ 4/86	0.1		0.2
IL:MORRIS	10/ 2/86	0.2		0.2
IL:W. CHICAGO	9/30/86	0.1		0.2
KS:TOPEKA	10/ 1/86	0.1		0.2
LA:NEW ORLEANS	10/ 1/86	0.3		0.2
MA:LAWRENCE	10/ 1/86	0.1		0.2
MD:BALTIMORE	10/ 1/86	0.1		0.2
MD:CONOWINGO	10/21/86	0.5		0.2
ME:AUGUSTA	10/23/86	0.2		0.2
MI:DETROIT	10/ 1/86	0.3		0.2
MI:GRAND RAPIDS	10/ 2/86	0.2		0.2
MN:MINNEAPOLIS	10/ 1/86	0.2		0.2
MN:RED WING	10/ 7/86	0.1		0.2
MS:JACKSON	10/21/86	0.2		0.2
MS:PORT GIBSON	10/21/86	0.1		0.2
MT:HELENA	9/29/86	0.3		0.2
NC:CHARLOTTE	10/ 9/86	0.5		0.2
NC:WILMINGTON	10/10/86	0.3		0.2
ND:BISMARCK	10/ 8/86	0.3		0.2
NE:LINCOLN	10/14/86	0.3		0.2

TABLE 12 (CONTINUED)

DRINKING WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1986

LOCATION	DATE COLLECTED	nCi/l	$\pm$	2s
NH:CONCORD	9/29/86	0.2		0.2
NJ:TRENTON	10/24/86	0.1		0.2
NJ:WARETOWN	10/23/86	0.1		0.2
NM:SANTA FE	10/ 6/86	0.1		0.2
NV:LAS VEGAS	10/ 3/86	0.2		0.2
NY:ALBANY	10/ 2/86	0.2		0.2
NY:NEW YORK CITY	10/ 1/86	0.1		0.2
NY:NIAGARA FALLS	10/ 2/86	0.2		0.2
NY:SYRACUSE	12/12/86	0.3		0.2
OH:CINCINNATI	12/15/86	0.2		0.2
OH:COLUMBUS	10/ 1/86	0.1		0.2
OH:EAST LIVERPOOL	11/12/86	0.2		0.2
OH:PAINESVILLE	10/ 3/86	0.2		0.2
OH:TOLEDO	9/30/86	0.3		0.2
OK:OKLAHOMA CITY	10/ 3/86	0.2		0.2
OR:PORTLAND	10/ 6/86	0.2		0.2
PA:COLUMBIA	10/ 2/86	0.1		0.2
PA:HARRISBURG	10/ 1/86	0.1		0.2
PA:PITTSBURGH	10/31/86	0.2		0.2
PC:ANCON	10/20/86	0.1		0.2
RI:PROVIDENCE	10/ 1/86	0.1		0.2
SC:BARNWELL	10/ 2/86	0.2		0.2
SC:COLUMBIA	10/ 3/86	0.3		0.2
SC:HARTSVILLE	10/13/86	0.2		0.2
SC:JENKINSVILLE	10/31/86	0.3		0.2
SC:SENECA	10/28/86	0.3		0.2
TN:CHATTANOOGA	10/ 1/86	0.2		0.2
TN:KNOXVILLE	10/ 3/86	0.1		0.2
TN:KNOXVILLE	12/31/86	0.1		0.2
TX:AUSTIN	10/30/86	0.2		0.2
VA:DOSWELL	10/14/86	0.2		0.2
VA:LYNCHBURG	10/ 1/86	0.3		0.2
VA:VIRGINIA BEACH	10/ 8/86	0.2		0.2
VI:ST. THOMAS	10/14/86	0.1		0.2
WA:RICHLAND	10/ 6/86	0.1		0.2
WA:SEATTLE	11/12/86	0.1		0.2
WI:GENOA CITY	10/20/86	0.1		0.2
WI:MADISON	10/ 1/86	0.1		0.2
WV:WHEELING	12/15/86	0.1		0.2

s = SIGMA COUNTING ERROR

TABLE 13

PLUTONIUM AND URANIUM ANALYSES
OF
SELECTED DRINKING WATER COMPOSITE SAMPLES

LOCATION	1986									
	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
	pCi/l	$\pm 2s$	pCi/l	$\pm 2s$	pCi/l	$\pm 2s$	pCi/l	$\pm 2s$	pCi/l	$\pm 2s$
AL:SCOTTSBORO	0.006	0.013	0.000	0.001	0.043	0.019	0.001	0.003	0.036	0.017
CA:LOS ANGELES	-.001	0.007	0.000	0.004	2.091	0.193	0.088	0.023	1.655	0.159
CO:PLATTEVILLE	0.011	0.008	0.002	0.003	7.400	0.652	0.241	0.047	5.671	0.510
IL:MORRIS	0.004	0.008	0.003	0.004	0.391	0.052	0.006	0.005	0.048	0.016
IL:W. CHICAGO	0.011	0.021	0.005	0.007	1.652	0.182	0.004	0.012	0.102	0.030
KS:TOPEKA	0.004	0.013	0.002	0.004	0.815	0.112	0.036	0.021	0.786	0.108
MN:RED WING	0.003	0.007	-0.001	0.003	0.311	0.049	0.002	0.003	0.028	0.014
ND:BISMARCK	-.001	0.003	0.000	0.001	0.131	0.027	0.012	0.009	0.090	0.022
NM:SANTA FE	0.005	0.008	-0.003	0.005	33.090	3.072	1.036	0.255	27.120	2.570
NV:LAS VEGAS	0.017	0.013	0.002	0.003	2.443	0.267	0.052	0.023	1.469	0.176
NY:ALBANY	0.007	0.007	0.000	0.003	0.068	0.021	0.005	0.006	0.042	0.015
SC:JENKINSVILLE	0.051	0.097	0.017	0.027	23.210	2.107	0.204	0.097	4.961	0.613

THE MINIMUM DETECTABLE LEVEL IS .015 pCi/SAMPLE, FOR EACH INDIVIDUAL ISOTOPE.

s = SIGMA COUNTING ERROR

TABLE 14
IODINE-131 IN DRINKING WATER
1985

LOCATION	DATE COLLECTED	pCi/l	<u>+</u>	2s
AK:FAIRBANKS	1/14/85	-0.1		0.1
AL:DOTHAN	4/11/85	-0.2		0.1
AL:MONTGOMERY	7/ 8/85	0.0		0.1
AL:MUSCLE SHOALS	1/ 8/85	-0.1		0.1
AL:SCOTTSBORO	1/ 8/85	0.3		0.2
AR:LITTLE ROCK	1/ 2/85	0.1		0.1
CA:BERKELEY	4/ 9/85	0.1		0.1
CA:LOS ANGELES	7/ 9/85	0.1		0.1
CO:DENVER	10/28/85	-0.3		0.2
CO:PLATTEVILLE	6/17/85	0.1		0.1
CT:HARTFORD	4/ 3/85	0.0		0.1
DC:WASHINGTON	4/15/85	0.2		0.1
DE:DOVER	4/ 8/85	0.0		0.1
FL:MIAMI	1/ 2/85	0.0		0.1
FL:TAMPA	1/14/85	-0.1		0.1
GA:SAVANNAH	1/15/85	0.0		0.1
HI:HONOLULU	1/17/85	0.0		0.1
IA:CEDAR RAPIDS	4/10/85	0.1		0.1
ID:BOISE	12/24/85	0.0		0.1
ID:IDAHO FALLS	1/14/85	0.0		0.1
IL:MORRIS	1/ 2/85	0.1		0.1
KS:TOPEKA	1/ 2/85	0.1		0.1
LA:NEW ORLEANS	4/22/85	0.0		0.1
MA:LAWRENCE	1/ 8/85	0.2		0.1
MA:ROWE	6/ 5/85	0.1		0.1
MD:BALTIMORE	4/ 2/85	0.1		0.1
MD:CONOWINGO	10/15/85	0.0		0.1
ME:AUGUSTA	1/ 3/85	-0.2		0.1
MI:DETROIT	4/ 3/85	-0.1		0.1
MI:GRAND RAPIDS	1/ 9/85	0.2		0.1
MN:MINNEAPOLIS	4/ 3/85	0.1		0.1
MN:RED WING	4/ 8/85	0.1		0.1
MS:JACKSON	1/ 7/85	0.0		0.1
MS:PORT GIBSON	1/ 8/85	-0.1		0.1
MT:HELENA	7/11/85	-0.2		0.1
NC:CHARLOTTE	4/15/85	0.0		0.1
NC:WILMINGTON	10/ 8/85	-0.1		0.2
ND:BISMARCK	4/ 3/85	0.0		0.1
NE:LINCOLN	1/14/85	0.1		0.1
NH:CONCORD	4/ 3/85	0.2		0.1

TABLE 14 (CONTINUED)
IODINE-131 IN DRINKING WATER
1985

LOCATION	DATE COLLECTED	pCi/l	$\pm$	2s
NJ:TRENTON	7/ 9/85	0.1		0.1
NJ:WARETOWN	4/17/85	0.0		0.1
NM:SANTA FE	7/16/85	0.0		0.1
NV:LAS VEGAS	1/ 7/85	-0.1		0.1
NY:ALBANY	1/14/85	-0.2		0.1
NY:NEW YORK CITY	7/ 3/85	0.0		0.1
NY:NIAGARA FALLS	4/ 3/85	0.0		0.1
OH:CINCINNATI	1/ 2/85	0.3		0.1
OH:COLUMBUS	4/ 8/85	0.0		0.1
OH:EAST LIVERPOOL	1/24/85	0.0		0.1
OH:PAINESVILLE	1/ 2/85	0.0		0.1
OH:TOLEDO	10/ 7/85	0.0		0.1
OK:OKLAHOMA CITY	4/ 3/85	0.2		0.1
OR:PORTLAND	1/ 4/85	0.3		0.1
PA:COLUMBIA	4/ 3/85	0.1		0.1
PA:HARRISBURG	4/10/85	0.0		0.1
PA:PITTSBURGH	1/24/85	-0.1		0.1
PC:ANCON	10/ 8/85	-0.1		0.1
RI:PROVIDENCE	1/14/85	-0.3		0.1
SC:BARNWELL	4/26/85	0.1		0.1
SC:BARNWELL	7/11/85	0.2		0.1
SC:COLUMBIA	1/ 4/85	0.1		0.1
SC:HARTSVILLE	4/ 8/85	0.0		0.1
SC:JENKINSVILLE	4/12/85	0.0		0.1
SC:SENECA	1/24/85	0.2		0.1
TN:CHATTANOOGA	7/ 1/85	0.1		0.1
TN:KNOXVILLE	1/ 2/85	0.2		0.1
TX:AUSTIN	1/ 7/85	0.0		0.1
VA:DOSWELL	8/ 6/85	0.1		0.1
VA:LYNCHBURG	1/ 3/85	0.1		0.1
VA:VIRGINIA BEACH	1/ 7/85	0.0		0.1
WA:RICHLAND	1/ 8/85	0.4		0.2
WA:SEATTLE	7/ 9/85	0.1		0.1
WI:GENOA CITY	4/ 8/85	-0.3		0.1
WI:MADISON	4/ 2/85	0.1		0.1

s = SIGMA COUNTING ERROR

TABLE 15

IODINE-131 IN DRINKING WATER
1986

LOCATION	DATE COLLECTED	pCi/l	$\pm$	2s
AK:FAIRBANKS	1/10/86	-0.4		0.1
AL:DOTHAN	1/ 3/86	-0.1		0.1
AL:MONTGOMERY	4/ 7/86	-0.2		0.1
AL:MUSCLE SHOALS	1/ 7/86	0.1		0.1
AL:SCOTTSBORO	1/ 8/86	-0.2		0.1
AR:LITTLE ROCK	1/ 3/86	-0.4		0.1
CA:BERKELEY	7/ 7/86	-0.1		0.1
CA:LOS ANGELES	1/ 2/86	-0.3		0.1
CO:DENVER	4/21/86	0.1		0.1
CO:PLATTEVILLE	10/ 8/86	0.0		0.1
CT:HARTFORD	4/ 4/86	0.0		0.1
DC:WASHINGTON	4/ 7/86	0.0		0.2
DE:DOVER	7/ 3/86	0.1		0.1
FL:MIAMI	1/ 2/86	0.1		0.1
FL:TAMPA	1/22/86	0.0		0.1
GA:SAVANNAH	1/ 3/86	-0.1		0.1
HI:HONOLULU	7/21/86	0.1		0.1
IA:CEDAR RAPIDS	7/ 2/86	0.1		0.1
ID:BOISE	9/16/86	0.1		0.1
ID:IDAHO FALLS	8/18/86	0.1		0.1
IL:MORRIS	7/ 2/86	-0.1		0.1
IL:W. CHICAGO	9/30/86	-0.1		0.1
KS:TOPEKA	7/ 1/86	0.2		0.1
LA:NEW ORLEANS	4/ 3/86	-0.1		0.1
MA:LAWRENCE	4/ 8/86	-0.1		0.2
MA:ROWE	7/ 7/86	-0.2		0.1
MD:BALTIMORE	7/ 2/86	0.0		0.1
MD:BALTIMORE	10/ 1/86	-0.1		0.1
MD:CONOWINGO	4/15/86	0.0		0.2
ME:AUGUSTA	1/ 3/86	0.1		0.1
MI:DETROIT	4/ 9/86	-0.4		0.2
MI:GRAND RAPIDS	10/ 2/86	-0.2		0.2
MN:MINNEAPOLIS	1/13/86	-0.1		0.1
MN:RED WING	1/ 9/86	-0.3		0.1
MS:JACKSON	7/22/86	0.2		0.1
MS:PORT GIBSON	1/ 8/86	-0.4		0.1
MT:HELENA	1/ 6/86	-0.1		0.1
NC:CHARLOTTE	1/ 6/86	0.0		0.1
NC:WILMINGTON	7/16/86	0.0		0.1
NE:LINCOLN	1/15/86	-0.1		0.1
NH:CONCORD	1/ 8/86	-0.2		0.1
NJ:TRENTON	4/ 7/86	-0.2		0.1
NJ:WARETOWN	10/23/86	-0.1		0.1
NM:SANTA FE	10/ 6/86	0.1		0.1

TABLE 15 (CONTINUED)
IODINE-131 IN DRINKING WATER
1986

LOCATION	DATE COLLECTED	pCi/l	<u>+</u>	2s
NV:LAS VEGAS	4/ 8/86	-0.4		0.1
NY:ALBANY	10/ 2/86	0.1		0.1
NY:NEW YORK CITY	4/21/86	0.0		0.1
NY:NIAGARA FALLS	1/ 6/86	0.0		0.1
NY:SYRACUSE	9/11/86	0.0		0.1
NY:SYRACUSE	12/12/86	0.0		0.1
OH:CINCINNATI	9/29/86	0.1		0.1
OH:COLUMBUS	1/ 2/86	-0.3		0.2
OH:EAST LIVERPOOL	1/15/86	-0.1		0.1
OH:PAINESVILLE	1/ 6/86	-0.1		0.1
OH:TOLEDO	4/ 1/86	-0.1		0.1
OK:OKLAHOMA CITY	4/ 2/86	-0.1		0.1
OR:PORTLAND	1/ 3/86	-0.4		0.1
PA:COLUMBIA	10/ 2/86	0.0		0.1
PA:HARRISBURG	1/ 2/86	0.0		0.1
PA:PITTSBURGH	1/15/86	-0.3		0.1
PC:ANCON	4/ 8/86	0.1		0.1
RI:PROVIDENCE	1/ 2/86	0.3		0.2
SC:BARNWELL	4/17/86	-0.1		0.1
SC:COLUMBIA	1/ 3/86	-0.1		0.1
SC:HARTSVILLE	1/ 6/86	0.0		0.1
SC:JENKINSVILLE	4/11/86	-0.1		0.1
SC:SENECA	1/20/86	-0.1		0.1
TN:CHATTANOOGA	1/ 2/86	0.2		0.2
TN:KNOXVILLE	1/ 3/86	-0.1		0.1
TX:AUSTIN	7/28/86	-0.1		0.1
VA:DOSWELL	10/14/86	0.0		0.4
VA:LYNCHBURG	1/ 2/86	-0.4		0.1
VA:VIRGINIA BEACH	1/ 2/86	0.0		0.1
VI:ST. THOMAS	1/23/86	0.0		0.1
WA:RICHLAND	4/ 7/86	0.0		0.1
WA:SEATTLE	7/ 3/86	-0.1		0.1
WI:GENOA CITY	4/ 7/86	0.0		0.2
WI:MADISON	4/ 2/86	0.0		0.1

NS = NO SAMPLE

s = SIGMA COUNTING ERROR

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.* 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.

Results from the period October - December are shown in Table 16.

* Some of these sites may not return dosimeters each period and consequently the number of sites listed may vary slightly.

TABLE 16

ENVIRONMENTAL GAMMA AMBIENT MONITORING PROGRAM

LOCATION	DATE RANGE	INTEGRATED EXPOSURE	EXPOSURE RATE	
		MR	MICRO R/HR	$\pm 2 s$
AL:MONTGOMERY	10/03/86- 1/05/87	22.4	9.9	3.9
CA:BERKELEY	10/01/86-12/31/86	16.3	7.5	6.0
CO:DENVER	10/01/86- 1/06/87	40.6	17.5	9.3
FL:ORLANDO	10/01/86- 1/02/87	16.3	7.3	4.3
ID:BOISE	10/21/86- 1/22/87	30.3	13.6	3.0
IL:CHICAGO	10/07/86- 2/06/87	29.1	9.9	2.8
ND:BISMARCK	9/30/86- 1/02/87	29.5	13.1	4.7
NJ:TRENTON	10/03/86-12/30/86	28.0	13.3	6.5
NM:SANTA FE	10/06/86- 1/02/87	34.3	16.3	5.3
NV:LAS VEGAS	10/02/86- 1/05/87	19.1	8.4	6.0
NY:NEW YORK CITY	10/17/86- 1/07/87	18.8	9.6	5.2
OH:COLUMBUS	10/02/86- 1/08/87	19.9	8.5	5.3
OK:OKLAHOMA CITY	10/07/86-12/30/86	18.4	9.1	3.4
OR:PORTLAND	10/02/86- 1/12/87	19.8	8.1	4.4
PA:HARRISBURG	10/01/86- 1/14/87	20.0	8.0	4.6
PA:PITTSBURGH	10/02/86- 1/02/87	26.4	12.0	4.1
RI:PROVIDENCE	10/01/86- 1/02/87	26.4	11.8	10.1
SC:BARNWELL	10/30/86- 1/08/87	16.4	9.8	4.2
SC:COLUMBIA	10/03/86- 1/06/87	26.0	11.4	4.1
TN:KNOXVILLE	10/07/86-12/31/86	21.7	10.6	7.5
VA:RICHMOND	10/03/86- 1/05/87	18.2	8.1	5.7
VT:MONTPELIER	10/17/86- 1/21/87	20.6	9.0	7.2

s = SIGMA ERROR (IN PERCENT)

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 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.

The values for the pasteurized milk samples for October - December are shown in Tables 17 - 19.

Strontium values for these locations shown in Table 20.

TABLE 17

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

OCTOBER 1986

LOCATION	DATE COLLECTED	K g/l+2s	^{137}Cs pCi/l+2s	^{140}Ba pCi/l+2s	^{131}I pCi/l+2s
AL:MONTGOMERY	10/10/86	1.53 0.13	11 7	1 9	0 7
AR:LITTLE ROCK	10/ 5/86	1.51 0.13	13 7	-2 9	4 7
AZ:PHOENIX	10/ 8/86	1.48 0.12	6 7	-2 9	8 7
CA:LOS ANGELES	10/16/86	1.54 0.12	3 7	1 8	9 7
CA:SACRAMENTO	10/ 7/86	1.60 0.09	2 5	4 6	5 5
CA:SAN FRANCISCO	10/ 3/86	1.58 0.13	0 7	1 9	5 7
CO:DENVER	10/30/86	1.52 0.12	7 7	1 8	6 7
CT:HARTFORD	10/ 6/86	1.59 0.13	6 7	13 9	6 7
DC:WASHINGTON	10/ 3/86	1.62 0.13	5 7	9 9	5 7
DE:WILMINGTON	10/ 1/86	1.51 0.13	0 7	3 9	4 7
FL:TAMPA	10/ 8/86	1.53 0.13	7 7	3 9	1 7
HI:HONOLULU	10/16/86	1.66 0.12	5 7	-2 8	2 7
IA:DES MOINES	10/ 6/86	1.65 0.12	8 7	1 8	9 7
ID:IDAHO FALLS	10/28/86	1.61 0.13	5 7	2 9	2 7
IL:CHICAGO	10/ 6/86	1.62 0.13	9 7	9 9	4 7
IN:INDIANAPOLIS	10/ 6/86	1.46 0.09	9 5	2 6	4 5
KS:WICHITA	10/ 9/86	1.52 0.13	11 7	2 9	2 7
KY:LOUISVILLE	10/ 7/86	1.77 0.13	8 7	5 8	9 7
MA:BOSTON	10/ 7/86	1.64 0.13	8 7	5 9	2 7
MD:BALTIMORE	10/ 2/86	1.62 0.09	6 5	-5 6	5 5
ME:PORTLAND	10/ 8/86	1.76 0.13	14 7	1 8	6 7
MI:DETROIT	10/10/86	1.60 0.13	-1 7	1 9	0 7
MI:GRAND RAPIDS	10/ 6/86	1.77 0.13	8 7	6 8	1 7
MN:MINNEAPOLIS	10/ 6/86	1.65 0.12	7 7	4 8	3 7
MO:KANSAS CITY	10/ 9/86	1.78 0.13	5 7	-2 8	-5 7
MO:ST. LOUIS	10/ 8/86	1.56 0.09	7 5	5 6	4 5
MS:JACKSON	10/13/86	1.56 0.13	7 7	2 9	5 7
NC:CHARLOTTE	10/13/86	1.89 0.25	2 18	-6 19	16 14
ND:MINOT	10/23/86	1.48 0.12	9 7	0 9	2 7
NE:OMAHA	10/ 8/86	1.50 0.12	6 7	10 8	9 7
NH:MANCHESTER	10/ 7/86	1.69 0.12	4 7	-1 8	6 7
NJ:TRENTON	10/ 8/86	1.75 0.09	2 5	1 6	1 5
NM:ALBUQUERQUE	10/ 6/86	1.47 0.09	8 5	9 6	1 5
NV:LAS VEGAS	10/ 6/86	1.63 0.12	9 7	8 8	10 7
NY:BUFFALO	10/ 6/86	1.53 0.13	7 7	4 9	10 7
NY:NEW YORK CITY	10/ 6/86	1.58 0.13	11 7	6 9	9 7
NY:SYRACUSE	10/ 6/86	1.58 0.12	4 7	1 8	9 7
OH:CINCINNATI	10/ 2/86	1.58 0.13	1 7	-6 9	4 7
OH:CLEVELAND	10/15/86	1.89 0.25	19 18	-11 18	5 14
OK:OKLAHOMA CITY	10/14/86	1.51 0.13	8 7	2 9	5 7
OR:PORTLAND	10/10/86	1.61 0.13	10 7	-5 9	6 7
PA:PHILADELPHIA	10/ 6/86	1.56 0.13	5 7	2 9	4 7

TABLE 17 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

OCTOBER 1986

LOCATION	DATE COLLECTED	K g/l+2s	^{137}Cs pCi/l+2s	^{140}Ba pCi/l+2s	^{131}I pCi/l+2s
PA:PITTSBURGH	10/ 8/86	1.57 0.12	-2 7	-2 8	2 7
PC:CRISTOBAL	10/23/86	1.45 0.09	12 5	-3 6	4 5
PR:SAN JUAN	10/10/86	1.71 0.13	-1 7	-1 9	9 7
SD:RAPID CITY	10/ 6/86	1.55 0.13	7 7	6 9	1 7
TN:CHATTANOOGA	10/ 6/86	1.50 0.13	6 7	-3 9	6 7
TN:MEMPHIS	10/27/86	1.51 0.13	0 7	-2 9	4 7
TX:AUSTIN	10/27/86	1.52 0.13	2 7	-1 9	2 7
UT:SALT LAKE CITY	10/ 6/86	1.60 0.08	8 5	-4 6	6 5
VA:NORFOLK	10/ 2/86	1.64 0.12	7 7	2 8	4 7
VT:BURLINGTON	10/ 3/86	1.47 0.09	8 5	2 6	3 5
WA:SEATTLE	10/10/86	1.62 0.09	12 5	-4 6	4 5
WI:MILWAUKEE	10/31/86	1.68 0.12	4 7	-3 8	4 7
WV:CHARLESTON	10/21/86	1.72 0.25	22 18	7 19	12 14
WY:LARAMIE	10/ 7/86	1.63 0.12	4 7	0 8	3 7

s = SIGMA COUNTING ERROR

TABLE 18
CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

NOVEMBER 1986

LOCATION	DATE COLLECTED	K g/l+2s	^{137}Cs pCi/l+2s	^{140}Ba pCi/l+2s	^{131}I pCi/l+2s
AK:ANCHORAGE	11/11/86	1.63 0.12	13 7	1 8	5 7
AL:MONTGOMERY	11/ 6/86	1.66 0.12	6 7	6 8	1 7
AR:LITTLE ROCK	11/10/86	1.65 0.08	8 5	-1 6	2 5
AZ:PHOENIX	11/ 6/86	1.65 0.12	9 7	7 8	2 7
CA:LOS ANGELES	11/14/86	1.50 0.08	5 5	2 6	5 5
CA:SACRAMENTO	11/ 4/86	1.60 0.12	-1 7	3 8	2 7
CA:SAN FRANCISCO	11/ 1/86	1.61 0.12	5 7	1 8	7 7
CO:DENVER	11/28/86	1.51 0.13	6 7	5 9	-2 7
CT:HARTFORD	11/ 3/86	1.63 0.13	6 7	-3 9	6 7
DC:WASHINGTON	11/ 1/86	1.53 0.13	6 7	0 9	5 7
DE:WILMINGTON	11/ 5/86	1.54 0.13	3 7	6 9	3 7
FL:TAMPA	11/ 4/86	1.51 0.13	3 7	-8 9	4 7
GA:ATLANTA	11/ 5/86	1.45 0.12	10 7	0 9	7 7
HI:HONOLULU	11/10/86	1.65 0.13	5 7	-11 9	1 7
IA:DES MOINES	11/ 3/86	1.55 0.08	7 5	4 6	-1 5
ID:IDAHO FALLS	11/20/86	1.54 0.13	7 9	5 11	5 8
IL:CHICAGO	11/ 3/86	1.53 0.07	2 4	2 5	2 4
IN:INDIANAPOLIS	11/ 3/86	1.58 0.12	10 7	0 8	8 7
KS:WICHITA	11/ 7/86	1.68 0.12	2 7	-1 8	4 7
KY:LOUISVILLE	11/ 4/86	1.55 0.13	4 7	2 9	7 7
LA:NEW ORLEANS	11/10/86	1.42 0.12	3 7	-1 9	1 7
MA:BOSTON	11/ 4/86	1.58 0.09	3 5	-1 6	2 5
MD:BALTIMORE	11/ 7/86	1.62 0.12	6 7	-2 8	-1 7
ME:PORTLAND	11/ 5/86	1.76 0.25	22 18	-8 19	-3 14
MI:DETROIT	11/ 7/86	1.65 0.13	7 7	-3 9	7 7
MI:GRAND RAPIDS	11/ 3/86	1.54 0.12	9 7	-1 8	6 7
MN:MINNEAPOLIS	11/ 4/86	1.62 0.12	12 7	0 8	10 7
MN:ST. PAUL	11/ 3/86	1.91 0.25	0 18	-5 19	10 14
MO:KANSAS CITY	11/ 7/86	1.59 0.13	2 7	-3 9	4 7
MO:ST. LOUIS	11/ 5/86	1.59 0.12	-1 7	0 8	2 7
MS:JACKSON	11/ 4/86	1.50 0.13	3 7	2 9	5 7
MT:HELENA	11/13/86	1.51 0.09	3 5	3 6	1 5
NC:CHARLOTTE	11/10/86	1.73 0.25	13 18	8 19	-3 14
ND:MINOT	11/24/86	1.53 0.13	5 7	4 9	6 7
NH:MANCHESTER	11/ 3/86	1.51 0.13	7 7	3 9	1 7
NJ:TRENTON	11/ 5/86	1.61 0.12	4 7	4 8	1 7
NM:ALBUQUERQUE	11/ 3/86	1.47 0.12	6 7	-2 9	8 7
NV:LAS VEGAS	11/17/86	1.43 0.12	8 7	5 9	2 7
NY:BUFFALO	11/24/86	1.50 0.13	3 7	1 9	5 7
NY:NEW YORK CITY	11/ 3/86	1.61 0.12	6 7	2 8	2 7
NY:SYRACUSE	11/ 3/86	1.43 0.12	3 7	1 9	6 7
OH:CINCINNATI	11/14/86	1.61 0.12	5 7	2 8	1 7

TABLE 18 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

NOVEMBER 1986

LOCATION	DATE COLLECTED	K g/l+2s		¹³⁷ Cs pCi/l+2s		¹⁴⁰ Ba pCi/l+2s		¹³¹ I pCi/l+2s	
OH:CLEVELAND	11/ 7/86	1.90	0.25	13	18	13	19	6	14
OK:OKLAHOMA CITY	11/17/86	1.58	0.12	4	7	5	8	6	7
OR:PORTLAND	11/10/86	1.72	0.12	9	7	1	8	3	7
PA:PHILADELPHIA	11/ 3/86	1.51	0.12	1	7	-1	8	2	7
PA:PITTSBURGH	11/ 6/86	1.48	0.09	6	5	-1	6	5	5
PC:CRISTOBAL	11/25/86	1.42	0.12	13	7	-3	9	3	7
PR:SAN JUAN	11/13/86	1.58	0.09	2	5	3	6	6	5
SD:RAPID CITY	11/ 3/86	1.52	0.12	0	7	0	8	3	7
TN:CHATTANOOGA	11/ 3/86	1.64	0.12	2	7	-1	10	6	7
TN:KNOXVILLE	11/ 3/86	1.71	0.24	12	18	-13	18	-1	14
TN:MEMPHIS	11/12/86	1.58	0.12	5	7	-2	8	2	7
UT:SALT LAKE CITY	11/ 3/86	1.52	0.13	8	7	2	9	8	7
VA:NORFOLK	11/ 1/86	1.56	0.12	6	7	8	8	7	7
VT:BURLINGTON	11/ 1/86	1.50	0.13	7	7	-2	9	2	7
WA:SEATTLE	11/ 7/86	1.61	0.13	12	7	-7	9	-1	7
WI:MILWAUKEE	11/28/86	1.66	0.13	3	7	0	9	5	7
WV:CHARLESTON	11/19/86	1.80	0.25	12	18	12	19	10	14
WY:LARAMIE	11/ 4/86	1.57	0.12	6	7	7	8	1	7

s = SIGMA COUNTING ERROR

TABLE 19

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

DECEMBER 1986

LOCATION	DATE COLLECTED	K g/l+2s	^{137}Cs pCi/l+2s	^{140}Ba pCi/l+2s	^{131}I pCi/l+2s
AL:MONTGOMERY	12/ 5/86	1.79 0.25	6 18	0 19	6 14
AR:LITTLE ROCK	12/ 2/86	1.58 0.13	9 7	-6 9	7 7
AZ:PHOENIX	12/10/86	1.60 0.08	9 5	4 6	4 5
CA:LOS ANGELES	12/ 9/86	3.62 0.27	13 15	-1 20	4 15
CA:SACRAMENTO	12/ 2/86	1.52 0.13	3 7	-13 9	7 7
CA:SAN FRANCISCO	12/ 5/86	1.63 0.12	5 7	-1 8	-1 7
CO:DENVER	12/31/86	1.57 0.12	12 7	6 8	1 7
CT:HARTFORD	12/ 1/86	1.57 0.13	8 7	-7 9	3 7
DE:WILMINGTON	12/ 9/86	1.62 0.13	7 7	1 9	5 7
FL:TAMPA	12/ 2/86	1.57 0.12	8 7	0 8	4 7
GA:ATLANTA	12/ 8/86	1.47 0.12	5 7	0 9	4 7
HI:HONOLULU	12/ 2/86	1.66 0.12	8 7	5 8	6 7
IA:DES MOINES	12/ 1/86	1.59 0.12	7 7	1 8	8 7
IL:CHICAGO	12/ 1/86	1.53 0.13	2 7	-5 9	6 7
IN:INDIANAPOLIS	12/ 8/86	1.51 0.13	6 7	0 9	5 7
KS:WICHITA	12/ 2/86	1.61 0.08	3 5	-1 6	3 5
KY:LOUISVILLE	12/ 2/86	1.52 0.13	1 7	-1 9	3 7
LA:NEW ORLEANS	12/ 3/86	1.55 0.13	6 7	-1 9	5 7
MA:BOSTON	12/ 3/86	1.58 0.13	9 7	4 9	2 7
MD:BALTIMORE	12/ 5/86	1.70 0.13	4 7	-5 9	5 7
ME:PORTLAND	12/ 2/86	1.40 0.08	10 5	1 6	4 5
MI:DETROIT	12/11/86	1.56 0.12	11 7	0 8	2 7
MI:GRAND RAPIDS	12/ 8/86	2.15 0.11	13 7	2 8	4 6
MN:MINNEAPOLIS	12/ 8/86	1.47 0.12	7 7	-4 9	4 7
MN:ST. PAUL	12/ 2/86	1.68 0.24	14 18	2 19	0 14
MO:KANSAS CITY	12/ 5/86	1.57 0.13	7 7	0 9	8 7
MO:ST. LOUIS	12/ 3/86	1.65 0.13	3 7	4 9	-2 7
MS:JACKSON	12/ 2/86	1.48 0.12	4 7	-3 9	6 7
MT:HELENA	12/29/86	1.58 0.13	6 7	0 9	7 7
NC:CHARLOTTE	12/ 2/86	1.70 0.24	19 18	-14 18	2 14
ND:MINOT	12/24/86	1.61 0.13	7 7	7 9	2 7
NE:OMAHA	12/ 5/86	1.36 0.12	6 7	-1 8	8 7
NH:MANCHESTER	12/ 8/86	1.59 0.13	8 7	-4 9	7 7
NJ:TRENTON	12/ 3/86	1.61 0.13	4 7	-3 9	1 7
NM:ALBUQUERQUE	12/ 1/86	1.54 0.12	5 7	2 8	1 7
NV:LAS VEGAS	12/10/86	1.65 0.12	5 7	3 8	7 7
NY:BUFFALO	12/ 8/86	1.61 0.09	4 5	-5 6	4 5
NY:NEW YORK CITY	12/ 1/86	1.57 0.12	10 7	0 8	10 7
NY:SYRACUSE	12/ 1/86	1.45 0.12	4 7	-1 9	2 7
OH:CINCINNATI	12/11/86	1.54 0.13	6 7	1 9	10 7
OH:CLEVELAND	12/29/86	1.73 0.25	4 18	11 19	11 14
OK:OKLAHOMA CITY	12/16/86	1.57 0.12	4 7	-2 8	5 7

TABLE 19 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

DECEMBER 1986

LOCATION	DATE COLLECTED	K g/l+2s	^{137}Cs pCi/l+2s	^{140}Ba pCi/l+2s	^{131}I pCi/l+2s
OR:PORTLAND	12/ 1/86	1.60 0.07	6 4	1 5	7 4
PA:PHILADELPHIA	12/ 8/86	1.50 0.13	6 7	5 9	3 7
PA:PITTSBURGH	12/ 8/86	1.60 0.12	9 7	-4 8	6 7
PC:CRISTOBAL	12/19/86	1.60 0.12	11 7	5 8	1 7
PR:SAN JUAN	12/10/86	1.47 0.12	6 7	0 8	6 7
SC:CHARLESTON	12/ 2/86	1.56 0.12	2 7	0 8	2 7
SD:RAPID CITY	12/ 1/86	1.49 0.12	6 7	-3 9	6 7
TN:CHATTANOOGA	12/ 8/86	1.63 0.23	9 15	3 20	-4 14
TN:KNOXVILLE	12/ 8/86	1.78 0.17	14 11	7 14	14 10
TN:MEMPHIS	12/29/86	1.55 0.13	8 7	9 9	9 7
TX:AUSTIN	12/ 2/86	1.62 0.12	0 7	2 8	0 7
TX:FT. WORTH	12/ 4/86	1.67 0.17	12 13	-8 13	7 10
UT:SALT LAKE CITY	12/ 1/86	1.56 0.12	3 7	-1 8	3 7
VA:NORFOLK	12/ 3/86	1.65 0.12	4 7	-5 8	-2 7
VT:BURLINGTON	12/ 2/86	1.62 0.12	10 7	-7 8	3 7
WA:SEATTLE	12/ 8/86	1.49 0.11	12 7	-4 8	7 7
WV:CHARLESTON	12/ 8/86	1.66 0.17	14 13	5 13	10 10
WY:LARAMIE	12/ 2/86	1.79 0.25	11 18	-6 19	-2 14

s = SIGMA COUNTING ERROR

TABLE 20
STRONTIUM-90 AND STRONTIUM-89 IN PASTEURIZED MILK
EPA REGIONAL COMPOSITES
OCTOBER - DECEMBER 1986

REGION	⁹⁰ Sr		⁸⁹ Sr	
	pCi/l	± 2s	pCi/l	± 2s*
I	2.4	0.5	-1	1
II	2.1	0.5	0	1
III	2.2	0.2	1	0
IV	2.0	0.4	0	1
V	2.5	0.5	-1	1
VI	2.2	0.4	0	1
VII	1.5	0.5	1	1
VIII	1.5	0.3	1	1
IX	0.8	0.7	1	1
X	1.3	0.4	1	1

s = SIGMA COUNTING ERROR

s* = ANALYTICAL ERROR TERM WHICH CLOSELY APPROXIMATES THE
COUNTING ERROR

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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