

ENVIRONMENTAL

RADIATION

DATA

REPORT 80

October–December 1994

United States Environmental Protection Agency

Office of Radiation and Indoor Air

Preface

Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation and Indoor Air's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and contains data from the Environmental Radiation Ambient Monitoring System (ERAMS). Data from similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in the ERD when available.

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

Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the environment. The radiation analyses performed on these samples include gross alpha and gross beta levels, gamma analyses for fission products, and specific analyses for uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides ancillary information on natural background levels and on routine and accidental releases into the environment from stationary sources.

The radiochemical procedures used by NAREL to analyze the ERAMS samples are contained in the *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual* (EPA 520/5-84-006). Station operation and sample collection are in accordance with procedures contained in the *ERAMS Manual* (EPA 520/5-84-007, 008, 009).

Data Reporting Rationale

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

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

Reported Error Terms

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

Significant Figures

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

Reporting Levels

The reporting units, smallest increments for reporting, and routine minimum detectable concentrations (MDCs) for each isotope are shown in Table 1. The MDC is defined as the minimum concentration that gives a 95% probability of detection when the detection criteria are chosen to give only a 5% probability of false detection in a blank sample. Reporting increments are sometimes considerably smaller than MDCs to avoid truncation errors in averaging.

Averages

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

Table 1
ERAMS Reporting Increments and Minimum Detectable Concentrations for Radionuclide Analyses

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

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

†† The MDC for air is based on an assumed total sample volume of 60,000 m³. Measurement by alpha spectroscopy includes contributions of plutonium-239 and plutonium-240.

‡ The MDC for air is based on an assumed total sample volume of 60,000 m³.

‡‡ Activity as of the day of counting.

1. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation.

Airborne particulates are collected continuously at field stations representing wide geographic coverage, including present and potential sources of environmental radioactivity. Sampling sites are located throughout the United States.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a G-M survey meter† at 5 hours after collection to allow for radon and thoron daughter product decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found.

The filters are sent to NAREL for more sensitive analyses in a low background beta counter. Gamma scans are performed on all filters showing gross beta counts greater than 1 pCi/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 many field stations collecting air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements. A composite of the March, April, and May precipitation samples is analyzed for plutonium-238, -239, -240, and uranium-234, -235, and -238.

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

Tables 2–4 contain the data from airborne particulate samples for October–December 1994. Tables 5–7 contain the data from precipitation samples for October–December 1994. Table 8 contains the data from tritium in precipitation samples for October–December 1994 at the selected sites.

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

Table 2
Gross Beta in Airborne Particulates
October 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	8	0.0	0.0	0.0	0.02	0.01	0.01
AK:Juneau	8	0.0	0.0	0.0	0.00	0.00	0.00
AL:Montgomery	9	2.0	0.1	0.5	0.02	0.00	0.01
AR:Little Rock	9	0.6	0.1	0.3	0.04	0.01	0.02
AZ:Phoenix	4	1.1	0.6	0.7	0.02	0.01	0.01
CA:Berkeley	8	0.2	0.1	0.1	0.02	0.00	0.01
CA:Los Angeles	8	0.4	0.1	0.3	0.03	0.01	0.02
CO:Denver	8	1.9	0.5	0.8	0.02	0.01	0.01
CT:Hartford	2	0.1	0.1	0.1	0.01	0.01	0.01
DE:Wilmington	8	0.6	0.1	0.2	0.02	0.00	0.01
FL:Jacksonville	8	0.1	0.0	0.0	0.02	0.00	0.01
FL:Miami	9	0.1	0.0	0.0	0.01	0.00	0.01
HI:Honolulu	8	0.2	0.1	0.2	0.01	0.00	0.00
IA:Iowa City	9	1.1	0.1	0.5	0.02	0.01	0.01
ID:Boise	8	1.1	0.1	0.5	0.02	0.01	0.01
ID:Idaho Falls	9	0.0	0.0	0.0	0.02	0.01	0.01
IL:Chicago	8	0.6	0.0	0.3	0.02	0.01	0.02
IN:Indianapolis	8	0.9	0.2	0.4	0.02	0.01	0.01
KS:Topeka	7	1.7	0.3	1.0	0.03	0.01	0.01
KY:Frankfort	1	0.0	0.0	0.0	0.01	0.01	0.01
ME:Augusta	8	0.3	0.0	0.2	0.01	0.00	0.01
MI:Lansing	9	0.1	0.0	0.1	0.01	0.00	0.01
MN:Minneapolis	4	0.1	0.1	0.1	0.02	0.01	0.01
MO:Jefferson City	8	0.9	0.2	0.5	0.02	0.01	0.01
MS:Jackson	8	0.5	0.1	0.2	0.03	0.00	0.01
NC:Charlotte	6	0.1	0.0	0.1	0.02	0.01	0.02
NC:Wilmington	5	0.0	0.0	0.0	0.01	0.00	0.01
ND:Bismarck	6	1.1	0.2	0.5	0.01	0.01	0.01
NH:Concord	9	0.3	0.1	0.2	0.01	0.00	0.01
NJ:Trenton	9	1.8	0.2	0.9	0.01	0.00	0.01
NM:Santa Fe	7	0.4	0.1	0.2	0.02	0.01	0.01
NV:Las Vegas	9	0.3	0.1	0.2	0.03	0.01	0.02
NY:Albany	4	0.1	0.0	0.1	0.02	0.00	0.01
NY:Niagara Falls	8	0.3	0.1	0.2	0.01	0.00	0.01
NY:Syracuse	2	0.0	0.0	0.0	0.01	0.01	0.01
NY:Yaphank	7	0.4	0.0	0.1	0.01	0.01	0.01
OH:Columbus	4	0.1	0.1	0.1	0.01	0.01	0.01

Table 2 (continued)
Gross Beta in Airborne Particulates
October 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Painesville	8	0.5	0.2	0.3	0.02	0.00	0.01
OH:Ross	8	0.0	0.0	0.0	0.02	0.01	0.02
OH:Toledo	8	0.5	0.0	0.3	0.02	0.01	0.01
OR:Portland	8	0.3	0.0	0.0	0.01	0.00	0.01
PA:Harrisburg	9	1.0	0.0	0.3	0.03	0.01	0.01
PA:Pittsburgh	9	0.0	0.0	0.0	0.05	0.01	0.02
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	8	0.6	0.0	0.2	0.02	0.01	0.01
SD:Pierre	3	0.5	0.0	0.2	0.01	0.01	0.01
TN:Knoxville	8	0.5	0.1	0.2	0.03	0.01	0.02
TN:Nashville	8	0.3	0.1	0.2	0.03	0.01	0.01
TX:Austin	7	0.2	0.0	0.1	0.02	0.00	0.01
TX:El Paso	9	1.5	0.1	0.8	0.02	0.01	0.02
UT:Salt Lake City	6	0.4	0.1	0.2	0.02	0.01	0.01
VA:Lynchburg	9	1.0	0.4	0.7	0.02	0.01	0.01
VA:Virginia Beach	1	0.0	0.0	0.0	0.01	0.01	0.01
WA:Olympia	7	0.2	0.0	0.1	0.01	0.00	0.01
WA:Spokane	9	0.8	0.2	0.4	0.02	0.01	0.01
WI:Madison	8	1.1	0.1	0.4	0.01	0.00	0.01

Minimum Detectable Concentration for field estimates – 0.1 pCi/m³.

Table 3
Gross Beta in Airborne Particulates
 November 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	8	0.0	0.0	0.0	0.03	0.01	0.02
AK:Juneau	6	0.0	0.0	0.0	0.01	0.00	0.00
AL:Montgomery	8	0.6	0.1	0.3	0.02	0.01	0.01
AR:Little Rock	7	0.2	0.1	0.2	0.02	0.01	0.01
AZ:Phoenix	5	1.1	0.4	0.7	0.03	0.01	0.02
CA:Berkeley	9	0.2	0.0	0.1	0.02	0.00	0.01
CA:Los Angeles	8	0.4	0.1	0.3	0.04	0.01	0.02
CO:Denver	7	1.1	0.2	0.6	0.02	0.01	0.02
CT:Hartford	8	0.1	0.0	0.1	0.01	0.01	0.01
DE:Wilmington	9	0.3	0.0	0.2	0.02	0.01	0.01
FL:Jacksonville	6	0.1	0.0	0.0	0.01	0.00	0.01
FL:Miami	7	0.0	0.0	0.0	0.01	0.00	0.01
HI:Honolulu	9	0.2	0.1	0.1	0.00	0.00	0.00
IA:Iowa City	8	0.6	0.1	0.4	0.03	0.01	0.02
ID:Boise	9	0.7	0.1	0.3	0.02	0.00	0.01
ID:Idaho Falls	8	0.0	0.0	0.0	0.01	0.01	0.01
IL:Chicago	5	0.3	0.1	0.2	0.02	0.01	0.01
IN:Indianapolis	8	0.4	0.1	0.3	0.02	0.01	0.01
KS:Topeka	8	2.2	0.2	0.7	0.02	0.01	0.02
KY:Frankfort	3	0.0	0.0	0.0	0.01	0.01	0.01
ME:Augusta	6	0.2	0.0	0.1	0.01	0.00	0.01
MI:Lansing	8	0.1	0.0	0.1	0.02	0.01	0.01
MN:Minneapolis	5	0.4	0.1	0.2	0.02	0.01	0.01
MO:Jefferson City	7	0.3	0.1	0.2	0.02	0.01	0.01
MS:Jackson	8	0.3	0.1	0.2	0.02	0.01	0.01
NC:Charlotte	8	0.3	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	4	0.0	0.0	0.0	0.01	0.00	0.01
ND:Bismarck	7	1.5	0.2	0.7	0.02	0.01	0.01
NH:Concord	7	0.2	0.0	0.1	0.01	0.00	0.01
NJ:Trenton	7	0.7	0.1	0.3	0.02	0.01	0.01
NM:Santa Fe	7	0.4	0.1	0.2	0.01	0.01	0.01
NV:Las Vegas	8	0.4	0.1	0.2	0.02	0.01	0.02
NY:Albany	5	0.3	0.0	0.1	0.02	0.01	0.01
NY:Niagara Falls	8	0.8	0.0	0.2	0.02	0.01	0.01
NY:Yaphank	7	0.1	0.0	0.1	0.01	0.01	0.01
OH:Columbus	5	0.1	0.1	0.1	0.01	0.01	0.01
OH:Painesville	9	0.3	0.0	0.1	0.02	0.01	0.01

Table 3 (continued)
Gross Beta in Airborne Particulates
November 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Ross	8	0.0	0.0	0.0	0.02	0.01	0.01
OH:Toledo	8	0.4	0.1	0.2	0.02	0.01	0.01
OR:Portland	8	0.0	0.0	0.0	0.00	0.00	0.00
PA:Harrisburg	8	0.4	0.1	0.3	0.02	0.01	0.01
PA:Pittsburgh	8	0.2	0.2	0.2	0.02	0.01	0.01
SC:Barnwell	2	0.1	0.0	0.1	0.01	0.01	0.01
SC:Columbia	8	0.4	0.1	0.2	0.03	0.01	0.01
SD:Pierre	5	0.9	0.1	0.5	0.02	0.01	0.01
TN:Knoxville	6	1.2	0.0	0.5	0.03	0.01	0.02
TN:Nashville	10	0.2	0.0	0.1	0.02	0.01	0.01
TX:Austin	8	0.2	0.0	0.1	0.01	0.01	0.01
TX:El Paso	7	1.7	0.6	0.9	0.02	0.01	0.01
UT:Salt Lake City	8	0.3	0.0	0.1	0.02	0.01	0.01
VA:Lynchburg	7	0.6	0.1	0.4	0.01	0.01	0.01
VA:Virginia Beach	3	0.3	0.0	0.1	0.02	0.01	0.01
WA:Olympia	7	0.1	0.0	0.0	0.00	0.00	0.00
WA:Spokane	8	0.3	0.1	0.2	0.02	0.00	0.01
WI:Madison	9	0.8	0.0	0.3	0.02	0.01	0.01

Minimum Detectable Concentration for field estimates – 0.1 pCi/m³.

Table 4
Gross Beta in Airborne Particulates
 December 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	8	0.0	0.0	0.0	0.04	0.02	0.03
AK:Juneau	9	0.0	0.0	0.0	0.01	0.00	0.00
AL:Montgomery	9	0.9	0.1	0.3	0.02	0.01	0.01
AR:Little Rock	9	0.5	0.1	0.2	0.05	0.01	0.02
AZ:Phoenix	4	1.1	0.2	0.8	0.02	0.01	0.02
CA:Berkeley	8	0.3	0.0	0.1	0.02	0.00	0.01
CA:Los Angeles	9	0.9	0.2	0.3	0.02	0.00	0.01
CO:Denver	8	2.7	0.3	0.9	0.02	0.00	0.01
CT:Hartford	8	0.2	0.0	0.1	0.02	0.00	0.01
DE:Wilmington	9	0.2	0.0	0.1	0.02	0.01	0.01
FL:Jacksonville	8	0.2	0.0	0.1	0.01	0.00	0.01
FL:Miami	9	0.1	0.0	0.0	0.01	0.00	0.00
HI:Honolulu	8	0.2	0.1	0.2	0.00	0.00	0.00
IA:Iowa City	8	0.9	0.1	0.3	0.05	0.02	0.03
ID:Boise	9	0.6	0.1	0.2	0.04	0.01	0.02
ID:Idaho Falls	9	0.0	0.0	0.0	0.02	0.00	0.01
IL:Chicago	6	0.2	0.0	0.1	0.03	0.01	0.03
IN:Indianapolis	9	0.5	0.2	0.3	0.04	0.02	0.03
KS:Topeka	7	1.5	0.2	0.6	0.03	0.01	0.02
KY:Frankfort	1	0.0	0.0	0.0	0.01	0.01	0.01
ME:Augusta	7	0.1	0.0	0.0	0.02	0.01	0.02
MI:Lansing	9	0.2	0.0	0.1	0.03	0.01	0.02
MN:Minneapolis	4	0.2	0.0	0.1	0.07	0.03	0.05
MO:Jefferson City	8	0.8	0.1	0.4	0.03	0.01	0.02
MS:Jackson	8	0.3	0.1	0.2	0.02	0.01	0.01
NC:Charlotte	8	0.2	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	4	0.0	0.0	0.0	0.01	0.01	0.01
ND:Bismarck	8	0.4	0.1	0.2	0.05	0.01	0.02
NH:Concord	9	0.1	0.0	0.1	0.02	0.01	0.01
NJ:Trenton	8	0.8	0.0	0.3	0.02	0.01	0.01
NM:Santa Fe	8	1.5	0.0	0.4	0.03	0.01	0.01
NV:Las Vegas	9	0.4	0.0	0.2	0.03	0.01	0.02
NY:Albany	4	0.1	0.0	0.1	0.02	0.01	0.02
NY:Niagara Falls	9	0.3	0.0	0.1	0.02	0.01	0.02
NY:Yaphank	9	0.2	0.0	0.1	0.02	0.00	0.01
OH:Columbus	6	0.0	0.0	0.0	0.02	0.01	0.02
OH:Painesville	9	0.3	0.1	0.1	0.02	0.00	0.02

Table 4 (continued)
Gross Beta in Airborne Particulates
December 1994

Location	Number of Samples	5-Hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
OH:Ross	9	0.0	0.0	0.0	0.04	0.01	0.02
OH:Toledo	9	0.4	0.0	0.2	0.02	0.01	0.02
OR:Portland	8	0.0	0.0	0.0	0.01	0.00	0.00
PA:Harrisburg	9	0.3	0.0	0.2	0.03	0.01	0.01
PA:Pittsburgh	9	0.3	0.1	0.2	0.03	0.01	0.02
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	8	0.2	0.0	0.1	0.02	0.01	0.01
SD:Pierre	7	0.4	0.1	0.2	0.04	0.01	0.02
TN:Knoxville	8	1.0	0.0	0.4	0.04	0.01	0.03
TN:Nashville	8	0.3	0.1	0.2	0.03	0.01	0.02
TX:Austin	9	0.2	0.1	0.1	0.02	0.01	0.01
TX:El Paso	8	1.1	0.1	0.5	0.03	0.01	0.02
UT:Salt Lake City	7	0.2	0.0	0.1	0.02	0.01	0.01
VA:Lynchburg	6	0.6	0.3	0.4	0.01	0.01	0.01
VA:Virginia Beach	2	0.0	0.0	0.0	0.01	0.01	0.01
WA:Olympia	9	0.1	0.0	0.0	0.01	0.00	0.00
WA:Spokane	8	0.2	0.1	0.1	0.03	0.00	0.01
WI:Madison	9	0.3	0.1	0.2	0.04	0.01	0.02

Minimum Detectable Concentration for field estimates – 0.1 pCi/m³.

Table 5
Gross Beta and Specific Gamma in Precipitation
October 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	±2σ	Activity pCi/L ±2σ
AK:Juneau	149.6	0.18	0.05	ND
AL:Montgomery	111.4	0.06	0.03	ND
AR:Little Rock	76.0	0.14	0.03	ND
AZ:Phoenix	38.0	0.03	0.01	ND
CA:Berkeley	10.0	0.01	0.00	ND
CO:Denver	35.0	0.19	0.02	⁷ Be: 33.6±23.8
DE:Wilmington	21.0	0.08	0.01	⁷ Be: 56.5±45.0
FL:Jacksonville	247.0	0.13	0.06	ND
FL:Miami	112.0	0.05	0.03	ND
HI:Honolulu	52.8	0.06	0.02	ND
IA:Iowa City	8.0	0.01	0.00	ND
ID:Boise	8.0	0.02	0.00	ND
ID:Idaho Falls	22.8	0.03	0.01	ND
IL:Chicago	46.4	0.04	0.01	ND
ME:Augusta	71.0	0.29	0.03	²¹⁴ Pb: 11.3±6.6 ⁷ Be: 83.5±39.9
MI:Lansing	72.4	0.09	0.02	ND
MN:Minneapolis	108.0	0.09	0.03	⁷ Be: 49.9±37.7
MO:Jefferson City	70.0	0.07	0.02	ND
MS:Jackson	84.0	0.02	0.02	ND
NC:Charlotte	81.0	0.12	0.03	ND
NC:Wilmington	76.0	0.11	0.03	ND
ND:Bismarck	45.2	0.03	0.01	ND
NH:Concord	21.0	0.07	0.01	⁷ Be: 54.5±36.9
NJ:Trenton	11.4	0.02	0.00	ND
NM:Santa Fe	38.0	0.03	0.01	ND
NY:Albany	19.4	0.02	0.01	ND
NY:Niagara Falls	17.0	0.02	0.00	ND
NY:Syracuse	15.0	0.01	0.00	ND
NY:Yaphank	8.0	0.09	0.01	ND
OH:Painesville	68.8	0.13	0.03	ND
OH:Toledo	16.0	0.17	0.01	⁷ Be: 43.5±35.0
OR:Portland	52.0	0.05	0.02	ND
PA:Harrisburg	55.2	0.29	0.03	⁷ Be: 38.2±36.0
SC:Barnwell	180.0	0.28	0.06	ND
SC:Columbia	106.2	0.14	0.03	ND
TN:Knoxville	59.0	0.05	0.02	ND
TN:Nashville	74.6	0.05	0.02	ND
TX:Austin	140.0	0.16	0.04	ND
UT:Salt Lake City	50.4	0.09	0.02	ND

Table 5 (continued)

Gross Beta and Specific Gamma in Precipitation

October 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	$\pm 2\sigma$	Activity pCi/L $\pm 2\sigma$
VA:Lynchburg	31.0	0.10	0.01	ND
WA:Olympia	105.0	0.05	0.03	ND
WI:Madison	9.6	0.01	0.00	ND

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

Table 6
Gross Beta and Specific Gamma in Precipitation
 November 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	±2σ	Activity pCi/L ±2σ
AK:Juneau	70.0	0.02	0.02	⁷ Be: 29.1±27.2
AL:Montgomery	72.4	0.07	0.02	ND
AR:Little Rock	127.0	0.12	0.04	⁷ Be: 66.3±37.0
AZ:Phoenix	43.0	0.03	0.01	ND
CA:Berkeley	87.8	0.04	0.02	ND
CO:Denver	28.0	0.10	0.01	⁷ Be: 50.6±36.0
CT:Hartford	40.0	0.05	0.01	ND
DE:Wilmington	77.0	0.09	0.02	ND
FL:Jacksonville	168.4	0.16	0.05	ND
FL:Miami	100.0	0.03	0.03	ND
HI:Honolulu	13.2	0.02	0.00	ND
IA:Iowa City	66.0	0.10	0.02	⁷ Be: 35.8±35.1
ID:Boise	37.2	0.10	0.02	ND
IL:Chicago	99.8	0.06	0.03	ND
ME:Augusta	85.0	0.13	0.03	⁷ Be: 55.4±24.0
MI:Lansing	115.8	0.13	0.04	⁷ Be: 44.0±26.0 ²¹⁴ Bi: 6.8±6.6
MN:Minneapolis	12.6	0.01	0.00	ND
MO:Jefferson City	163.0	0.17	0.05	⁷ Be: 69.1±41.2
MS:Jackson	76.0	0.06	0.02	ND
NC:Charlotte	61.0	0.08	0.02	⁴⁰ K: 41.2±40.7
NC:Wilmington	55.0	0.04	0.02	ND
ND:Bismarck	15.4	0.02	0.00	⁷ Be: 62.2±42.1
NJ:Trenton	56.8	0.10	0.02	ND
NV:Las Vegas	5.6	0.02	0.00	ND
NY:Albany	50.8	0.04	0.01	ND
NY:Niagara Falls	44.0	0.05	0.01	⁷ Be: 49.6±32.9
NY:Syracuse	16.0	0.01	0.00	ND
NY:Yaphank	32.0	0.04	0.01	ND
OH:Painesville	152.6	0.36	0.06	⁷ Be: 63.6±36.7
OH:Toledo	84.0	0.36	0.04	ND
OR:Portland	25.2	0.04	0.01	⁷ Be: 37.3±26.9
PA:Harrisburg	99.2	0.22	0.04	⁷ Be: 51.3±23.7
SC:Barnwell	66.6	0.18	0.03	ND
SC:Columbia	71.6	0.08	0.02	ND
TN:Knoxville	60.0	0.12	0.02	ND
TN:Nashville	45.2	0.03	0.01	ND
TX:Austin	70.0	0.03	0.02	ND
TX:El Paso	11.0	0.04	0.01	ND

Table 6 (continued)

Gross Beta and Specific Gamma in Precipitation

November 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	$\pm 2\sigma$	Activity pCi/L $\pm 2\sigma$
UT:Salt Lake City	65.2	0.05	0.02	ND
VA:Lynchburg	28.6	0.29	0.02	ND
WA:Olympia	130.0	0.10	0.04	⁷ Be: 43.7 \pm 35.5
WI:Madison	66.0	0.07	0.02	ND

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

Table 7
Gross Beta and Specific Gamma in Precipitation
 December 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	±2σ	Activity pCi/L ±2σ
AL:Montgomery	62.0	0.01	0.02	⁷ Be: 35.7±32.5
AR:Little Rock	56.0	0.02	0.02	ND
AZ:Phoenix	40.0	0.03	0.01	ND
CA:Berkeley	77.0	0.05	0.02	ND
CT:Hartford	130.0	0.16	0.05	ND
DE:Wilmington	54.0	0.10	0.02	⁷ Be: 74.3±32.5
FL:Jacksonville	66.2	0.08	0.02	⁷ Be: 48.4±32.6
FL:Miami	88.0	0.10	0.03	ND
HI:Honolulu	41.0	0.04	0.01	ND
IA:Iowa City	21.0	0.07	0.01	ND
ID:Boise	55.0	0.04	0.02	ND
ID:Idaho Falls	8.0	0.01	0.00	ND
IL:Chicago	81.6	0.06	0.03	⁷ Be: 31.7±27.3
MN:Minneapolis	13.0	0.03	0.01	⁷ Be: 48.2±25.9
MO:Jefferson City	26.0	0.03	0.01	⁷ Be: 67.7±26.6
MS:Jackson	95.0	0.07	0.03	ND
NC:Charlotte	37.0	0.06	0.01	⁷ Be: 50.8±26.0
				²¹² Pb: 8.3±5.1
NC:Wilmington	65.0	0.06	0.02	ND
ND:Bismarck	11.6	0.01	0.00	ND
NJ:Trenton	40.0	0.05	0.01	⁷ Be: 40.3±34.5
NM:Santa Fe	38.0	0.00	0.01	ND
NY:Albany	58.0	0.02	0.02	ND
NY:Niagara Falls	23.0	0.06	0.01	ND
NY:Yaphank	8.0	0.00	0.00	ND
OH:Painesville	58.4	0.14	0.02	ND
OH:Toledo	88.0	0.16	0.04	²¹² Pb: 9.6±4.8
				⁷ Be: 32.4±25.8
OR:Portland	67.8	0.06	0.02	ND
PA:Harrisburg	91.2	0.12	0.04	⁷ Be: 47.7±32.2
SC:Barnwell	134.6	0.22	0.05	⁷ Be: 42.8±28.7
SC:Columbia	166.6	0.10	0.05	ND
TN:Knoxville	54.0	0.01	0.02	ND
TN:Nashville	65.8	0.07	0.02	ND
TX:Austin	80.0	0.03	0.02	⁴⁰ K: 43.7±33.6
				⁷ Be: 27.1±27.0
TX:El Paso	40.0	0.03	0.02	ND
VA:Lynchburg	23.8	0.07	0.01	ND
WA:Olympia	414.0	0.23	0.11	²¹² Bi: 19.8±19.5
				⁷ Be: 53.0±34.2

Table 7 (continued)

Gross Beta and Specific Gamma in Precipitation

December 1994

Location	Depth (mm)	Gross Beta Activity		Specific Gamma
		nCi/m ²	$\pm 2\sigma$	Activity pCi/L $\pm 2\sigma$
WI:Madison	36.4	0.10	0.02	⁷ Be: 46.6 \pm 37.8

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

Table 8
Tritium in Precipitation
 October–December 1994

Location	October 1994		November 1994		December 1994	
	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$
AK: Juneau	0.1	0.2	0.1	0.2	NS	
AL: Montgomery	0.1	0.2	0.1	0.2	0.1	0.1
AR: Little Rock	0.1	0.2	0.2	0.2	0.1	0.1
AZ: Phoenix	0.1	0.2	0.2	0.2	0.1	0.2
CA: Berkeley	0.1	0.2	0.2	0.1	0.1	0.1
CO: Denver	0.1	0.2	0.2	0.2	NS	
CT: Hartford	NS		0.2	0.2	0.1	0.1
DE: Wilmington	0.1	0.2	0.2	0.2	0.1	0.1
FL: Jacksonville	0.1	0.3	0.1	0.2	0.1	0.2
FL: Miami	0.1	0.3	0.1	0.2	0.1	0.3
HI: Honolulu	0.2	0.2	0.3	0.1	0.1	0.2
IA: Iowa City	0.1	0.2	0.2	0.2	0.1	0.1
ID: Boise	0.1	0.1	0.3	0.2	0.1	0.2
ID: Idaho Falls	0.2	0.2	NS		0.1	0.3
IL: Chicago	0.1	0.2	0.1	0.2	0.1	0.1
ME: Augusta	0.2	0.2	0.1	0.2	NS	
MI: Lansing	0.1	0.1	0.1	0.2	NS	
MN: Minneapolis	0.1	0.2	0.1	0.2	0.2	0.2
MO: Jefferson City	0.1	0.2	0.1	0.2	0.1	0.1
MS: Jackson	0.1	0.2	0.1	0.1	0.1	0.1
NC: Charlotte	0.1	0.2	0.1	0.2	0.1	0.2
NC: Wilmington	0.1	0.2	0.1	0.2	0.1	0.2
ND: Bismarck	0.1	0.2	0.1	0.2	0.1	0.1
NH: Concord	0.2	0.2	NS		NS	
NJ: Trenton	0.1	0.2	0.1	0.2	0.3	0.2
NM: Santa Fe	0.2	0.2	NS		0.1	0.1
NV: Las Vegas	NS		0.1	0.2	NS	
NY: Albany	0.1	0.2	0.1	0.2	0.3	0.2
NY: Niagara Falls	0.1	0.2	0.3	0.2	0.1	0.1
NY: Syracuse	0.1	0.2	0.2	0.2	NS	
NY: Yaphank	0.1	0.3	0.1	0.2	0.1	0.2
OH: Painesville	0.2	0.2	0.1	0.2	0.1	0.1
OH: Toledo	0.1	0.2	0.1	0.2	0.1	0.1
OR: Portland	0.1	0.1	0.1	0.1	0.1	0.1
PA: Harrisburg	0.1	0.2	0.1	0.1	0.1	0.3
SC: Barnwell	0.2	0.2	0.3	0.2	0.5	0.1
SC: Columbia	0.1	0.1	0.1	0.2	0.1	0.1
TN: Knoxville	0.2	0.2	0.2	0.2	0.1	0.1
TN: Nashville	0.2	0.2	0.1	0.2	0.1	0.1
TX: Austin	0.1	0.3	0.2	0.2	0.1	0.1
TX: El Paso	NS		0.1	0.1	0.1	0.1

Table 8 (continued)
Tritium in Precipitation
October–December 1994

Location	October 1994		November 1994		December 1994	
	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$	nCi/L	$\pm 2\sigma$
UT:Salt Lake City	0.1	0.1	0.1	0.2	NS	
VA:Lynchburg	0.1	0.2	0.1	0.2	0.1	0.3
WA:Olympia	0.1	0.2	0.2	0.1	0.1	0.3
WI:Madison	0.2	0.2	0.3	0.2	0.1	0.1

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

Plutonium and Uranium in Airborne Particulates and Precipitation

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

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

Plutonium and uranium results are published when they become available.

Table 9 contains the plutonium and uranium results for the period July–December 1994.

Table 9
Plutonium and Uranium In Airborne Particulates
July–December 1994 Composites

Location	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$
AK:Fairbanks	ND		ND		6.7	1.3	0.5	0.4	7.0	1.4
AK:Juneau	0.4	0.5	0.1	0.2	2.6	0.8	0.1	0.2	2.9	0.9
AL:Montgomery	0.2	0.6	ND		8.2	1.6	0.3	0.3	8.4	1.6
AR:Little Rock	0.1	0.6	0.3	0.4	28.3	3.7	1.3	0.7	25.7	3.5
AZ:Phoenix	ND		0.1	0.4	42.8	4.4	1.9	0.8	34.2	3.8
CA:Berkeley	0.2	0.5	0.2	0.2	6.3	1.3	0.4	0.4	7.7	1.5
CA:Los Angeles	0.2	0.6	ND		24.0	2.8	1.6	0.7	26.5	3.0
CO:Denver	0.4	0.7	0.6	0.5	36.6	4.2	1.0	0.6	38.0	4.3
CT:Hartford	0.2	0.4	0.5	0.3	10.5	1.8	1.0	0.5	10.8	1.8
DE:Wilmington	ND		0.1	0.2	18.1	2.3	0.9	0.5	16.5	2.2
FL:Jacksonville	ND		0.1	0.1	10.7	1.4	0.4	0.3	9.7	1.3
FL:Miami	0.7	0.7	1.0	0.6	14.7	2.3	0.9	0.5	14.8	2.3
HI:Honolulu	ND		0.1	0.2	2.1	0.8	ND		1.5	0.7
IA:Iowa City	0.5	0.6	0.2	0.2	14.7	2.0	0.7	0.4	15.3	2.1
ID:Boise	ND		0.5	0.5	37.3	4.1	0.8	0.6	34.2	3.8
ID:Idaho Falls	ND		0.2	0.3	20.1	2.7	0.9	0.5	21.4	2.8
IL:Chicago	ND		0.2	0.4	25.5	3.5	2.1	1.0	22.8	3.3
IN:Indianapolis	ND		ND		26.2	4.7	2.5	1.4	27.5	4.8
KS:Topeka	ND		ND		14.9	2.2	0.8	0.5	13.1	2.0
KY:Frankfort	ND		0.1	0.1	6.7	1.3	0.4	0.4	6.5	1.3
MA:Lawrence	1.5	1.5	0.4	0.5	18.3	3.6	1.0	0.8	19.2	3.7
ME:Augusta	0.1	0.2	1.1	0.4	11.5	1.3	0.8	0.3	11.8	1.3
MI:Lansing	ND		0.1	0.2	9.7	1.6	0.2	0.2	9.9	1.6
MN:Minneapolis	0.3	0.6	ND		20.9	2.8	1.1	0.6	17.9	2.5
MO:Jefferson City	0.4	0.8	0.1	0.2	10.6	2.0	0.9	0.6	8.8	1.8
MS:Jackson	ND		ND		9.7	1.7	0.9	0.5	10.6	1.8
NC:Charlotte	0.1	0.5	ND		NA		NA		NA	
NC:Wilmington	ND		0.1	0.2	11.5	1.4	0.4	0.3	9.6	1.3
ND:Bismarck	ND		0.2	0.3	16.7	2.3	0.8	0.5	14.2	2.1
NH:Concord	ND		1.2	0.4	7.3	0.9	0.4	0.2	7.8	0.9
NJ:Trenton	0.1	0.3	ND		8.2	1.1	0.4	0.2	6.8	1.0
NM:Santa Fe	ND		0.2	0.3	19.9	2.6	0.8	0.5	18.3	2.5
NV:Las Vegas	ND		1.0	0.9	102	9	2.3	1.2	68.3	7.1
NY:Albany	ND		0.2	0.3	19.2	3.0	1.7	0.9	19.0	3.0
NY:Niagara Falls	ND		0.1	0.2	32.2	3.0	5.6	1.0	31.2	2.9
NY:Syracuse	0.4	0.6	0.5	0.4	12.2	1.8	0.8	0.4	12.2	1.8
NY:Yaphank	ND		ND		6.3	1.0	0.3	0.2	6.5	1.0

Table 9 (continued)

Plutonium and Uranium In Airborne Particulates

July–December 1994 Composites

Location	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$	aCi/m ³	$\pm 2\sigma$
OH:Columbus	0.2	0.4	0.1	0.2	14.3	2.3	1.1	0.6	15.2	2.4
OH:Painesville	0.1	0.4	ND		11.3	1.8	1.0	0.5	12.1	1.9
OH:Ross	ND		ND		29.0	4.3	1.9	1.0	34.2	4.6
OH:Toledo	ND		ND		16.1	2.0	0.5	0.4	15.7	2.0
OR:Portland	ND		ND		8.7	1.7	1.0	0.5	6.6	1.4
PA:Harrisburg	ND		0.1	0.1	71.1	9.8	1.5	1.3	72.1	9.9
PA:Pittsburgh	ND		ND		19.9	1.9	1.5	0.5	20.0	1.9
SC:Barnwell	ND		0.3	0.2	8.6	1.1	0.3	0.2	8.4	1.1
SC:Columbia	0.3	0.5	0.1	0.1	22.4	2.1	1.2	0.4	19.5	1.9
SD:Pierre	0.3	1.0	ND		11.7	2.2	0.7	0.5	11.4	2.1
TN:Knoxville	ND		0.2	0.5	18.6	3.0	1.0	0.7	17.5	2.9
TN:Nashville	0.3	0.4	0.2	0.2	18.4	2.0	0.9	0.4	16.5	1.8
TX:Austin	ND		ND		10.4	2.0	0.7	0.6	11.2	2.1
TX:El Paso	ND		0.6	0.9	64.0	9.0	3.2	1.9	57.9	8.5
UT:Salt Lake City	ND		0.6	0.5	34.1	3.6	1.4	0.7	26.4	3.1
VA:Lynchburg	0.2	0.3	0.3	0.3	131	10	3.4	0.8	10.6	1.5
VA:Virginia Beach	ND		0.1	0.2	13.9	1.4	0.8	0.3	12.7	1.3
WA:Olympia	ND		ND		3.0	0.6	0.1	0.1	2.2	0.5
WA:Spokane	0.6	0.8	0.8	0.6	20.7	2.7	0.8	0.5	19.1	2.5
WI:Madison	ND		0.3	0.3	9.1	1.9	0.7	0.5	9.6	1.9

Note: σ = Counting Error. NA = No Analysis. ND = Not Detectable.

2. Water Program

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

Surface Water

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

Table 10 contains the tritium concentration data for October–December 1994. Table 11 contains the surface water annual gamma results for January–December 1994.

Table 10
Tritium in Surface Water
October–December 1994

Location	Source	Date Collected	³ H	
			nCi/L	±2σ
AL:Decatur	Tennessee River	10/18/94	0.1	0.2
AL:Gordon	Chattahoochee River	10/25/94	0.1	0.1
AL:Scottsboro	Tennessee River	10/17/94	0.1	0.1
AR:Little Rock	Arkansas River	10/04/94	0.1	0.2
CA:Clay Station	Folsom S. Canal	10/04/94	0.2	0.2
CA:Eureka	Humboldt Bay	10/06/94	0.1	0.2
CA:San Onofre	Pacific Ocean	11/16/94	0.1	0.2
CO:Platteville	South Platte River	10/05/94	0.2	0.2
CT:East Haddam	Connecticut River	10/17/94	0.1	0.2
CT:Waterford	Long Island Sound	10/17/94	0.1	0.2
FL:Crystal River	Gulf Of Mexico	11/01/94	0.3	0.2
FL:Ft. Pierce	Atlantic Ocean	10/10/94	0.1	0.2
FL:Homestead	Biscayne Bay	10/13/94	0.1	0.3
GA:Baxley	Altamaha River	10/10/94	0.2	0.2
IA:Cedar Rapids	Cedar River	10/19/94	0.1	0.2
ID:Buhl	Snake River	10/04/94	0.2	0.2
IL:Moline	Mississippi River	10/31/94	0.3	0.2
IL:Morris	Illinois River	10/11/94	0.2	0.2
IL:Zion	Lake Michigan	12/31/94	0.1	0.1
KS:Le Roy	Neosho River	12/27/94	0.2	0.2
LA:New Orleans	Mississippi River	11/11/94	0.1	0.1
MA:Plymouth	Cape Cod Bay	10/26/94	0.1	0.2
MD:Conowingo	Susquehanna River	10/11/94	0.1	0.1
MD:Lusby	Chesapeake Bay	10/11/94	0.2	0.2
ME:Wiscasset	Montseway Bay	10/28/94	0.1	0.2
MI:Bridgman	Lake Michigan	10/11/94	0.2	0.2
MI:Charlevoix	Lake Michigan	10/06/94	0.1	0.2
MI:Monroe	Lake Erie	10/10/94	0.3	0.2
MI:South Haven	Lake Michigan	10/12/94	0.1	0.2
MN:Monticello	Mississippi River	10/12/94	0.1	0.2
MN:Red Wing	Mississippi River	10/05/94	0.2	0.2
MS:Port Gibson	Mississippi River	10/04/94	0.1	0.2
NC:Charlotte	Catawba River	10/12/94	0.5	0.2
NC:Southport	Atlantic Ocean	10/13/94	0.1	0.3
NE:Rulo	Missouri River	10/12/94	0.1	0.3
NJ:Bayside	Delaware River	10/11/94	0.2	0.2
NJ:Oyster Creek	Oyster Creek	10/13/94	0.1	0.2

Table 10 (continued)
Tritium in Surface Water
October–December 1994

Location	Source	Date Collected	³ H	
			nCi/L	±2σ
NV:Boulder City	Colorado River	11/08/94	0.1	0.2
NY:Chelsea	Hudson River	10/03/94	0.1	0.2
NY:Croton-On-Hudson	Hudson River	10/14/94	0.1	0.2
NY:Oswego	Lake Ontario	12/21/94	0.3	0.2
NY:Oswego	Lake Ontario	10/03/94	0.1	0.2
OH:Toledo	Lake Erie	10/03/94	0.1	0.2
OR:Bradwood	Columbia River	11/08/94	0.1	0.2
PA:Danville	Susquehanna River	10/12/94	0.1	0.2
PA:Philadelphia	Delaware River	12/08/94	0.1	0.2
PA:Philadelphia	Schuylkill R. - Belmont	12/08/94	0.1	0.1
PA:Philadelphia	Schuylkill R. - Queen	12/08/94	0.1	0.2
SC:Allendale	Savannah River	10/31/94	1.2	0.3
SC:Broad River	Broad River	10/25/94	0.1	0.2
SC:Hartsville	Lake Robinson	10/04/94	2.4	0.3
TN:Daisy	Tennessee River	10/26/94	0.1	0.2
TN:Kingston	Clinch River	10/05/94	0.2	0.2
TN:Oak Ridge	Clinch River	10/31/94	0.3	0.2
TX:El Paso	Rio Grande	10/11/94	0.1	0.2
TX:Matagorda	Colorado River	10/07/94	0.2	0.2
VA:Doswell	North Anna River	10/03/94	3.0	0.3
VA:Newport News	James River	10/25/94	0.1	0.3
VT:Vernon	Connecticut River	10/05/94	0.2	0.2
WA:Northport	Columbia River	11/28/94	0.2	0.2
WA:Richland	Columbia River	10/05/94	0.3	0.2
WI:Two Creeks	Lake Michigan	10/11/94	0.2	0.2
WI:Victory	Mississippi River	10/10/94	0.2	0.2
WV:Wheeling	Ohio River	10/04/94	0.2	0.2

Note: σ = Counting Error.

Table 11
Surface Water
Annual Gamma Analysis
January–December 1994

Location	Source	Date Collected	Specific Gamma Activity pCi/L $\pm 2\sigma$
AL:Decatur	Tennessee River	04/06/94	ND
AL:Gordon	Chattahoochee River	03/31/94	ND
AL:Scottsboro	Tennessee River	04/05/94	ND
AR:Little Rock	Arkansas River	04/12/94	ND
CA:Clay Station	Folsom S. Canal	04/05/94	²¹⁴ Bi: 12.8±5.2
CA:Diablo Canyon	Pacific Ocean	03/28/94	⁴⁰ K: 300±55
CA:Eureka	Humboldt Bay	04/07/94	⁴⁰ K: 282±45
CA:San Onofre	Pacific Ocean	05/18/94	⁴⁰ K: 310±43
CO:Platteville	South Platte River	04/13/94	¹³¹ I: 33.9±11.3
			¹³¹ I: 44.5±6.3
CT:East Haddam	Connecticut River	04/13/94	²¹⁴ Pb: 7.4±5.7
CT:Waterford	Long Island Sound	04/13/94	⁴⁰ K: 293±43
FL:Crystal River	Gulf Of Mexico	05/04/94	ND
FL:Ft. Pierce	Atlantic Ocean	05/02/94	⁴⁰ K: 42.7±39.6
FL:Homestead	Biscayne Bay	04/22/94	⁴⁰ K: 325±44
GA:Baxley	Altamaha River	04/12/94	ND
IA:Cedar Rapids	Cedar River	06/28/94	ND
ID:Buhl	Snake River	06/30/94	ND
IL:Moline	Mississippi River	04/01/94	ND
IL:Morris	Illinois River	04/02/94	ND
IL:Zion	Lake Michigan	06/28/94	ND
KS:Le Roy	Neosho River	06/23/94	ND
LA:New Orleans	Mississippi River	04/30/94	ND
MA:Plymouth	Cape Cod Bay	04/20/94	ND
MD:Conowingo	Susquehanna River	04/19/94	ND
MD:Lusby	Chesapeake Bay	04/11/94	⁴⁰ K: 67.1±38.0
ME:Wiscasset	Montseway Bay	04/12/94	⁴⁰ K: 148±42
MI:Bridgman	Lake Michigan	04/12/94	ND
MI:Charlevoix	Lake Michigan	04/07/94	ND
MI:Monroe	Lake Erie	04/11/94	ND
MI:South Haven	Lake Michigan	04/12/94	ND
MN:Monticello	Mississippi River	05/05/94	ND
MN:Red Wing	Mississippi River	04/13/94	ND
MS:Port Gibson	Mississippi River	04/26/94	ND
NC:Charlotte	Catawba River	05/09/94	ND
NC:Southport	Atlantic Ocean	04/14/94	⁴⁰ K: 213±43

Table 11 (continued)
Surface Water
Annual Gamma Analysis
January–December 1994

Location	Source	Date Collected	Specific Gamma Activity pCi/L $\pm 2\sigma$
NE:Rulo	Missouri River	04/25/94	ND
NJ:Bayside	Delaware River	04/12/94	ND
NJ:Oyster Creek	Oyster Creek	04/21/94	$^{40}\text{K}: 180 \pm 44$
NV:Boulder City	Colorado River	05/04/94	ND
NY:Chelsea	Hudson River	04/04/94	ND
NY:Croton-On-Hudson	Hudson River	04/22/94	ND
NY:Oswego	Lake Ontario	06/28/94	ND
OH:Toledo	Lake Erie	04/14/94	ND
OR:Bradwood	Columbia River	06/06/94	ND
PA:Danville	Susquehanna River	04/20/94	ND
PA:Philadelphia	Delaware River	04/21/94	ND
PA:Philadelphia	Schuylkill R. - Belmont	04/21/94	ND
PA:Philadelphia	Schuylkill R. - Queen	04/21/94	ND
SC:Allendale	Savannah River	04/29/94	ND
SC:Broad River	Broad River	04/07/94	ND
SC:Hartsville	Lake Robinson	04/11/94	ND
TN:Daisy	Tennessee River	04/14/94	ND
TN:Kingston	Clinch River	04/05/94	ND
TX:El Paso	Rio Grande	04/11/94	ND
TX:Matagorda	Colorado River	04/11/94	$^{40}\text{K}: 118 \pm 38$
VA:Doswell	North Anna River	04/06/94	ND
VA:Newport News	James River	04/15/94	$^{40}\text{K}: 75.6 \pm 29.9$
VT:Vernon	Connecticut River	04/13/94	ND
WA:Northport	Columbia River	05/16/94	ND
WA:Richland	Columbia River	04/20/94	ND
WI:Two Creeks	Lake Michigan	04/11/94	ND
WI:Victory	Mississippi River	04/11/94	ND
WV:Wheeling	Ohio River	04/05/94	ND

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

Drinking Water

This program monitors ambient radiation levels in drinking water at 78 sites. These data serve to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA “National Interim Primary Drinking Water Regulations.” These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/L, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/L, when tritium levels do not exceed 20,000 pCi/L, when the strontium-90 levels do not exceed 8 pCi/L, and when the gross beta levels do not exceed 50 pCi/L.

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

The analyses include (a) tritium on a quarterly basis; (b) gross alpha, gross beta, strontium-90, and gamma on annual composites; (c) radium-226 if the gross alpha exceeds 2 pCi/L and radium-228 if the radium-226 falls between 3 and 5 pCi/L; (d) specific iodine-131 on one quarterly sample per year for each station; and (e) an annual composite for plutonium-238, -239, and -240 and uranium-234, -235, and -238 for stations that demonstrate gross alpha levels greater than 2 pCi/L.

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

Table 12 contains the data from drinking water samples for October–December 1994. Table 13 contains the data on gross alpha, gross beta, strontium-90, and radium-226 in drinking water for January–December 1994. Table 14 contains the plutonium and uranium in drinking water data for January–December 1994. Table 15 contains the I-131 in drinking water results for January–December 1994.

Table 12
Tritium in Drinking Water
 October–December 1994

Location	Date Collected	^3H	
		nCi/L	$\pm 2\sigma$
AK:Fairbanks	10/03/94	0.1	0.2
AL:Dothan	10/25/94	0.1	0.3
AL:Montgomery	10/24/94	0.1	0.2
AL:Muscle Shoals	10/18/94	0.1	0.2
AL:Scottsboro	10/17/94	0.1	0.2
AR:Little Rock	10/04/94	0.1	0.3
CA:Berkeley	12/08/94	0.2	0.2
CO:Denver	10/07/94	0.1	0.2
CO:Platteville	10/05/94	0.1	0.2
DE:Dover	10/05/94	0.1	0.2
FL:Miami	10/10/94	0.1	0.2
FL:Tampa	12/06/94	0.1	0.2
GA:Baxley	10/10/94	0.1	0.2
GA:Savannah	10/18/94	0.1	0.2
IA:Cedar Rapids	10/19/94	0.1	0.1
ID:Idaho Falls	11/02/94	0.1	0.2
IL:Morris	10/19/94	0.1	0.1
IL:W. Chicago	12/30/94	0.1	0.1
KS:Topeka	10/05/94	0.1	0.3
LA:New Orleans	10/03/94	0.1	0.2
MA:Lawrence	10/24/94	0.1	0.1
MD:Baltimore	10/05/94	0.2	0.2
MD:Conowingo	10/11/94	0.1	0.2
ME:Augusta	11/09/94	0.1	0.2
MI:Detroit	10/31/94	0.3	0.2
MI:Grand Rapids	10/21/94	0.1	0.2
MN:Minneapolis	10/14/94	0.1	0.3
MN:Red Wing	10/19/94	0.2	0.2
MO:Jefferson City	12/30/94	0.2	0.2
MS:Jackson	10/05/94	0.1	0.2
MS:Port Gibson	10/04/94	0.1	0.2
MT:Helena	12/02/94	0.1	0.3
NC:Charlotte	10/12/94	0.2	0.2
NC:Wilmington	10/13/94	0.1	0.3
ND:Bismarck	10/04/94	0.1	0.2
NH:Concord	12/29/94	0.1	0.2
NJ:Trenton	10/14/94	0.1	0.3
NJ:Waretown	10/13/94	0.1	0.2
NM:Santa Fe	11/10/94	0.1	0.1
NV:Las Vegas	10/03/94	0.1	0.2
NY:Albany	10/03/94	0.2	0.2

Table 12 (continued)
Tritium in Drinking Water
October–December 1994

Location	Date Collected	³ H nCi/L ±2σ	
NY:New York City	10/05/94	0.1	0.2
NY:Niagara Falls	10/03/94	0.3	0.2
NY:Syracuse	12/27/94	0.2	0.2
OH:Cincinnati	12/06/94	0.1	0.2
OH:Columbus	10/07/94	0.2	0.2
OH:East Liverpool	10/07/94	0.2	0.2
OH:Painesville	10/11/94	0.2	0.2
OH:Toledo	10/03/94	0.4	0.2
OR:Portland	10/13/94	0.1	0.2
PA:Columbia	10/13/94	0.1	0.2
PA:Harrisburg	10/13/94	0.1	0.2
PA:Philadelphia	12/08/94	0.2	0.2
PA:Philadelphia	12/08/94	0.1	0.2
PA:Philadelphia	12/08/94	0.1	0.2
PA:Pittsburgh	10/07/94	0.1	0.2
PC:Corozal	10/04/94	0.1	0.2
RI:Providence	12/30/94	0.1	0.2
SC:Barnwell	10/11/94	0.1	0.2
SC:Columbia	10/05/94	0.2	0.2
SC:Jenkinsville	10/17/94	0.2	0.2
SC:Seneca	10/11/94	0.3	0.2
TN:Chattanooga	10/03/94	0.1	0.2
TN:Knoxville	12/29/94	0.2	0.2
TN:Knoxville	10/17/94	0.1	0.3
TX:Austin	10/03/94	0.1	0.2
VA:Doswell	12/29/94	0.2	0.1
VA:Lynchburg	10/03/94	0.1	0.2
VA:Virginia Beach	10/03/94	0.1	0.3
WA:Richland	10/05/94	0.1	0.2
WA:Seattle	12/29/94	0.1	0.2
WI:Genoa City	10/10/94	0.1	0.2
WI:Madison	10/03/94	0.1	0.2

Note: σ = Counting Error.

Table 13
Drinking Water
Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations
January–December 1994 Composites

Location	Total Solids (mg/L)	Gross Beta		Gross Alpha		⁹⁰ Sr		²²⁶ Ra		Specific Gamma Activity	
		pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AK:Fairbanks	131.0	3.3	0.7	0.1	0.8	0.0	0.2	ND			ND
AL:Dothan	186.0	2.2	0.7	ND		0.0	0.2	ND			ND
AL:Montgomery	91.5	1.7	1.2	0.2	1.1	0.1	0.2	ND			ND
AL:Muscle Shoals	81.8	1.3	0.5	ND		0.2	0.2	ND			ND
AL:Scottsboro	82.0	1.3	0.5	ND		0.4	0.2	ND			ND
AR:Little Rock	30.0	1.0	0.5	0.0	0.3	0.2	0.2	ND			ND
CA:Berkeley	20.6	0.8	0.5	0.1	0.3	ND		ND			ND
CA:Los Angeles	300.0	6.0	1.6	2.1	2.3	0.2	0.2	0.2	0.0		ND
CO:Denver	119.0	1.6	0.7	1.7	1.2	0.3	0.2	ND			ND
CO:Platteville	924.0	19.3	4.3	8.1	8.6	0.1	0.2	0.4	0.0		ND
CT:Hartford	42.8	1.2	0.6	ND		0.2	0.2	ND			ND
DC:Washington	138.0	3.0	1.5	1.1	1.4	NA		ND			ND
DE:Dover	261.0	2.8	1.0	0.7	1.5	0.0	0.2	ND			ND
FL:Miami	171.0	1.7	0.7	0.9	1.1	0.1	0.2	ND			ND
FL:Tampa	300.0	3.2	1.0	0.0	1.3	0.3	0.2	ND			ND
GA:Baxley	160.0	3.2	0.7	3.6	1.6	0.1	0.1	2.0	0.0		ND
GA:Savannah	130.0	1.6	0.6	ND		ND		ND			ND
HI:Honolulu	170.0	1.5	0.7	ND		ND		ND			ND
IA:Cedar Rapids	131.0	2.8	0.8	0.9	1.1	0.0	0.2	ND			ND
ID:Boise	101.0	1.0	0.7	0.8	0.9	0.0	0.2	ND			ND
ID:Idaho Falls	167.0	3.9	1.4	0.1	1.4	ND		ND			ND
IL:Morris	466.0	8.7	2.3	14.4	5.8	ND		2.9	0.1		ND
IL:W. Chicago	258.0	17.3	2.1	32.9	5.7	0.4	0.2	10.6	0.1		ND
KS:Topeka	237.0	2.6	1.7	0.3	1.9	0.3	0.2	ND			ND
LA:New Orleans	156.0	3.8	1.0	1.6	1.3	0.5	0.3	ND			ND
MA:Lawrence	102.0	2.9	0.9	0.4	0.9	0.2	0.2	ND			ND
MD:Baltimore	97.0	2.3	0.8	0.4	0.8	0.0	0.2	ND			ND
MD:Conowingo	174.0	1.9	0.7	0.4	1.0	0.0	0.2	ND			ND
ME:Augusta	53.2	2.1	0.6	0.5	0.5	0.0	0.2	ND			ND
MI:Detroit	79.4	1.8	0.6	0.5	0.8	0.5	0.2	ND			ND
MI:Grand Rapids	110.0	1.8	0.7	0.5	0.8	0.5	0.2	ND			ND
MN:Minneapolis	87.0	3.3	0.8	0.5	0.7	0.4	0.2	ND			ND
MN:Red Wing	85.3	1.8	0.9	2.5	1.3	0.0	0.2	1.4	0.0		ND
MO:Jefferson City	188.0	2.3	1.0	0.4	1.4	0.1	0.2	ND			ND
MS:Jackson	78.4	2.8	0.7	0.1	0.6	0.4	0.2	ND			ND

Table 13 (continued)

Drinking Water
Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations

January–December 1994 Composites

Location	Total Solids (mg/L)	Gross Beta		Gross Alpha		⁹⁰ Sr		²²⁶ Ra		Specific Gamma Activity	
		pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
MS:Port Gibson	225.0	3.3	1.2	1.6	1.6	0.2	0.2	ND			ND
MT:Helena	63.8	1.7	0.6	0.4	0.5	0.2	0.2	ND			ND
NC:Charlotte	47.2	2.6	0.6	0.3	0.5	ND		ND			ND
NC:Wilmington	180.0	3.9	0.7	1.0	1.1	0.3	0.2	ND			ND
ND:Bismarck	301.0	3.8	1.0	1.5	1.7	0.2	0.2	ND			ND
NE:Lincoln	307.0	11.6	1.7	8.4	3.4	0.2	0.2	0.3	0.0		ND
NH:Concord	77.2	0.6	0.6	0.2	0.5	0.1	0.2	ND			ND
NJ:Trenton	13.8	1.3	0.7	ND		ND		ND			ND
NJ:Waretown	88.2	2.2	0.6	2.2	1.1	0.0	0.2	0.4	0.0		ND
NM:Santa Fe	364.0	10.4	1.8	26.4	5.5	ND		0.2	0.0		ND
NV:Las Vegas	629.0	6.9	2.1	5.5	4.3	0.1	0.3	0.2	0.0		ND
NY:Albany	81.8	1.3	0.7	0.7	0.7	0.2	0.2	ND			ND
NY:New York City	42.8	0.3	0.5	0.2	0.4	0.0	0.2	ND			ND
NY:Niagara Falls	101.0	1.1	0.7	0.6	0.8	0.2	0.2	ND			ND
NY:Syracuse	100.0	1.6	0.7	0.1	0.7	0.1	0.2	ND			ND
OH:Cincinnati	187.0	2.7	0.8	0.3	1.0	0.2	0.2	ND			ND
OH:Columbus	330.0	4.4	1.1	ND		0.1	0.2	ND			ND
OH:East Liverpool	169.0	2.9	1.0	0.4	1.0	0.1	0.2	ND			ND
OH:Painesville	136.0	2.0	0.9	0.8	1.5	0.3	0.2	ND			ND
OH:Toledo	94.4	1.8	0.6	0.8	0.9	0.1	0.3	ND			ND
OK:Oklahoma City	72.2	2.7	0.7	0.0	0.5	0.2	0.2	ND			ND
OR:Portland	25.4	0.9	0.5	0.1	0.3	0.0	0.2	ND			ND
PA:Columbia	158.0	2.1	0.7	0.3	0.8	0.2	0.2	ND			ND
PA:Harrisburg	84.8	1.7	0.6	0.3	0.7	0.1	0.2	ND			ND
PA:Philadelphia	186.0	2.3	0.8	0.3	0.9	0.0	0.2	ND			ND
PA:Philadelphia - Baxter	182.0	2.8	0.8	0.1	0.9	0.2	0.2	ND			ND
PA:Philadelphia - Queen	210.0	2.9	0.9	0.0	1.0	0.0	0.2	ND			ND
PA:Pittsburgh	181.0	2.1	0.7	0.6	1.1	0.0	0.2	ND			ND
PC:Corozal	70.4	0.8	0.5	0.3	0.6	ND		ND			ND
RI:Providence	117.0	1.3	0.6	1.0	0.9	0.3	0.2	ND			ND
SC:Barnwell	24.8	1.2	0.5	0.6	0.4	0.2	0.2	ND			ND
SC:Columbia	81.6	2.5	0.6	ND		0.3	0.2	ND			ND
SC:Jenkinsville	214.0	5.7	1.0	5.9	2.2	ND		0.7	0.0		ND
SC:Seneca	29.4	1.0	0.5	0.2	0.4	0.2	0.2	ND			ND
TN:Chattanooga	95.2	1.7	0.6	0.0	0.6	0.2	0.2	ND			ND

Table 13 (continued)
Drinking Water
Alpha, Beta, Gamma, Sr-90, and Ra-226 Concentrations
January–December 1994 Composites

Location	Total Solids (mg/L)	Gross Beta		Gross Alpha		⁹⁰ Sr		²²⁶ Ra		Specific Gamma Activity pCi/L ±2σ
		pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	
TN:Knoxville	107.0	1.8	0.6	0.2	0.6	0.1	0.2	ND		ND
TX:Austin	197.0	3.0	1.0	ND		ND		ND		ND
VA:Doswell	154.0	3.9	0.9	0.4	1.0	0.0	0.2	ND		ND
VA:Lynchburg	50.6	0.8	0.5	0.2	0.4	0.1	0.2	ND		ND
VA:Virginia Beach	92.4	2.0	0.6	0.2	0.6	0.1	0.2	ND		ND
WA:Richland	58.2	0.6	0.8	0.6	0.7	0.2	0.2	ND		ND
WA:Seattle	32.6	0.2	0.6	ND		0.1	0.2	ND		ND
WI:Genoa City	148.0	2.0	0.6	1.4	1.0	ND		ND		ND
WI:Madison	230.0	2.6	0.8	4.3	1.9	ND		0.7	0.0	ND

Note: σ = Counting Error. NA = No Analysis. ND = Not Detectable.

Table 14
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January–December 1994

Location	²³⁸ Pu		^{239–240} Pu		²³⁴ U		²³⁵ U		²³⁸ U	
	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
CA:Los Angeles	ND		0.003	0.006	1.630	0.157	0.068	0.026	1.320	0.137
CO:Platteville	0.008	0.022	0.014	0.013	6.750	0.599	0.133	0.058	5.390	0.505
GA:Baxley	ND		0.009	0.012	0.035	0.016	0.004	0.005	0.010	0.011
IL:Morris	ND		ND		0.510	0.104	0.043	0.030	0.058	0.034
IL:W. Chicago	ND		0.007	0.012	1.730	0.263	0.051	0.048	0.104	0.064
MN:Red Wing	0.010	0.021	0.010	0.012	0.148	0.037	0.013	0.011	0.026	0.016
NE:Lincoln	0.006	0.034	0.008	0.017	4.310	0.434	0.144	0.060	2.740	0.317
NJ:Waretown	0.010	0.021	0.003	0.009	0.053	0.028	0.002	0.006	0.016	0.015
NM:Santa Fe	0.019	0.033	0.001	0.009	12.000	1.090	0.138	0.084	7.280	0.753
NV:Las Vegas	ND		0.005	0.009	2.620	0.203	0.083	0.026	1.590	0.142
SC:Jenkinsville	ND		0.006	0.008	0.614	0.078	0.022	0.014	0.280	0.050
WI:Madison	0.003	0.021	ND		1.940	0.148	0.029	0.014	0.456	0.059

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

Minimum Detectable Amount for individual isotopes is 0.015 pCi/sample.

Table 15
Iodine-131 in Drinking Water

January–December 1994

Location	Date Collected	pCi/L	$\pm 2\sigma$
AK:Fairbanks	04/06/94	ND	
AL:Dothan	01/13/94	ND	
AL:Montgomery	07/19/94	0.1	0.3
AL:Montgomery	10/24/94	ND	
AL:Muscle Shoals	01/12/94	ND	
AL:Muscle Shoals	04/06/94	ND	
AL:Scottsboro	01/12/94	0.1	0.1
AR:Little Rock	01/24/94	ND	
CA:Berkeley	04/27/94	ND	
CA:Los Angeles	01/03/94	ND	
CO:Denver	01/07/94	0.1	0.1
CO:Platteville	01/06/94	0.1	0.1
CT:Hartford	04/04/94	ND	
DC:Washington	07/21/94	ND	
DE:Dover	01/18/94	ND	
FL:Miami	01/31/94	ND	
FL:Tampa	01/20/94	ND	
GA:Baxley	01/11/94	ND	
GA:Savannah	05/20/94	ND	
HI:Honolulu	01/06/94	ND	
IA:Cedar Rapids	01/20/94	ND	
ID:Boise	01/03/94	ND	
ID:Idaho Falls	01/21/94	ND	
IL:W. Chicago	01/31/94	ND	
KS:Topeka	01/03/94	0.1	0.1
LA:New Orleans	01/03/94	ND	
MA:Lawrence	01/19/94	ND	
MD:Baltimore	01/03/94	ND	
MD:Conowingo	04/19/94	ND	
ME:Augusta	01/13/94	0.1	0.1
MI:Detroit	04/05/94	ND	
MI:Lansing	01/18/94	0.1	0.1
MN:Minneapolis	04/11/94	ND	
MN:Red Wing	04/05/94	ND	
MO:Jefferson City	01/01/94	ND	
MS:Jackson	01/20/94	ND	
MS:Port Gibson	04/26/94	ND	
MT:Helena	04/04/94	ND	
NC:Charlotte	01/12/94	ND	
NC:Wilmington	01/04/94	ND	

Table 15 (continued)
Iodine-131 in Drinking Water
January–December 1994

Location	Date Collected	pCi/L	$\pm 2\sigma$
ND:Bismarck	01/04/94	ND	
NE:Lincoln	07/27/94	0.1	0.3
NH:Concord	01/11/94	0.1	0.1
NJ:Trenton	01/12/94	0.1	0.1
NJ:Waretown	10/13/94	ND	
NM:Santa Fe	04/29/94	ND	
NV:Las Vegas	04/04/94	ND	
NY:Albany	01/03/94	ND	
NY:New York City	01/05/94	ND	
NY:Niagara Falls	07/06/94	0.1	0.2
OH:Cincinnati	09/30/94	0.1	0.1
OH:East Liverpool	05/10/94	0.2	0.1
OH:Painesville	01/04/94	0.1	0.1
OH:Toledo	01/02/94	0.1	0.1
OK:Oklahoma City	07/07/94	ND	
OR:Portland	07/06/94	ND	
PA:Columbia	01/26/94	0.2	0.1
PA:Harrisburg	07/21/94	0.3	0.2
PA:Philadelphia	09/20/94	0.6	0.1
PA:Philadelphia - Baxter	09/20/94	0.2	0.1
PA:Philadelphia - Queen	03/02/94	0.4	0.1
PA:Pittsburgh	05/10/94	0.1	0.1
PC:Corozal	01/12/94	ND	
RI:Providence	01/01/94	ND	
SC:Barnwell	01/14/94	0.1	0.1
SC:Columbia	01/04/94	0.1	0.1
SC:Jenkinsville	01/14/94	ND	
SC:Seneca	01/25/94	ND	
TN:Chattanooga	05/13/94	ND	
TN:Knoxville	01/26/94	0.1	0.1
TX:Austin	01/04/94	ND	
VA:Doswell	05/19/94	ND	
VA:Lynchburg	01/04/94	0.1	0.1
VA:Virginia Beach	10/03/94	ND	
WA:Richland	01/06/94	ND	
WA:Seattle	01/05/94	0.1	0.1
WI:Genoa City	04/11/94	ND	
WI:Madison	01/07/94	ND	

σ = Counting Error.
ND = Not Detectable.

3. Milk Program

Pasteurized Milk

Milk is a reliable indicator of the general population's intake of radionuclides since it is consumed fresh by a large segment of the population and can contain several of the biologically important radionuclides that result from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Monthly samples are collected at approximately 55 sampling sites with at least one located in most states, Puerto Rico, and the Panama Canal Zone. The samples are composited, according to production, from the major milk suppliers representing more than 80 percent of the milk consumed in a given population center.

The samples are analyzed for gamma emitting nuclides, including iodine-131, barium-140, cesium-137, and potassium. All samples collected in July are analyzed for strontium-90.

Also, for the first month of the three quarters beginning January, April, and October, 10 regional composite samples of milk made up from the states within each of EPA's 10 regions are analyzed for strontium-90.

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

Tables 16–18 contain the concentrations of radionuclides in pasteurized milk for October–December 1994. Table 19 contains the concentrations of strontium-90 in pasteurized milk EPA Regional Composites for October 1994.

Table 16
Radionuclides in Pasteurized Milk
 October 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AL:Montgomery	10/06/94	1.57	0.08	ND		ND		ND	
AR:Little Rock	10/18/94	1.66	0.09	ND		ND		ND	
AZ:Phoenix	10/14/94	1.67	0.08	ND		ND		ND	
CA:Los Angeles	10/13/94	1.57	0.12	ND		ND		ND	
CA:Sacramento	10/04/94	1.63	0.09	ND		ND		ND	
CA:San Francisco	10/04/94	1.75	0.09	ND		ND		ND	
CO:Denver	10/19/94	1.63	0.09	ND		ND		ND	
FL:Tampa	10/03/94	1.58	0.09	ND		ND		ND	
GA:Atlanta	10/12/94	1.45	0.08	ND		ND		ND	
HI:Honolulu	10/03/94	1.61	0.09	ND		ND		ND	
IA:Des Moines	10/03/94	1.62	0.09	ND		ND		ND	
IL:Chicago	10/06/94	1.62	0.09	ND		ND		ND	
IN:Indianapolis	10/04/94	1.60	0.09	ND		ND		ND	
KS:Wichita	10/25/94	1.65	0.06	ND		ND		ND	
KY:Louisville	10/04/94	1.63	0.08	ND		ND		ND	
LA:New Orleans	10/14/94	1.51	0.08	ND		ND		ND	
MA:Boston	10/07/94	1.57	0.09	ND		ND		ND	
MD:Baltimore	10/07/94	1.67	0.11	ND		ND		ND	
MI:Grand Rapids	10/03/94	1.64	0.08	ND		ND		ND	
MN:St. Paul	10/05/94	1.62	0.08	ND		ND		ND	
MO:Kansas City	10/26/94	1.61	0.08	ND		ND		ND	
MS:Jackson	10/04/94	1.67	0.08	ND		ND		ND	
NC:Charlotte	10/05/94	1.61	0.11	ND		ND		ND	
ND:Minot	10/04/94	1.51	0.12	ND		ND		ND	
NJ:Trenton	10/05/94	1.63	0.09	ND		ND		ND	
NM:Albuquerque	10/05/94	1.54	0.09	ND		ND		ND	
NV:Las Vegas	10/04/94	1.72	0.09	ND		ND		ND	
NY:Buffalo	10/12/94	1.59	0.08	ND		ND		ND	
NY:Syracuse	10/03/94	1.62	0.09	ND		ND		ND	
OH:Cincinnati	10/31/94	1.63	0.09	ND		ND		ND	
OH:Cleveland	10/12/94	1.69	0.09	ND		ND		ND	
OR:Portland	10/03/94	1.67	0.06	ND		ND		ND	
PA:Philadelphia	10/04/94	1.55	0.08	ND		ND		ND	
PA:Pittsburgh	10/05/94	1.57	0.09	ND		ND		ND	
PC:Cristobal	10/05/94	1.56	0.08	7	2	ND		ND	
PR:San Juan	10/07/94	1.58	0.09	ND		ND		ND	
SC:Charleston	10/05/94	1.63	0.09	ND		ND		ND	

Table 16 (continued)
Radionuclides in Pasteurized Milk
October 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
SD:Rapid City	10/04/94	1.69	0.15	ND		ND		ND	
TN:Chattanooga	10/03/94	1.53	0.12	ND		ND		ND	
TN:Knoxville	10/10/94	1.61	0.06	ND		ND		ND	
TN:Memphis	10/07/94	1.50	0.12	ND		ND		ND	
TX:Austin	10/25/94	1.66	0.09	ND		ND		ND	
TX:Ft. Worth	10/05/94	1.58	0.09	ND		ND		ND	
VA:Norfolk	10/29/94	1.66	0.08	ND		ND		ND	
VT:Burlington	10/18/94	1.53	0.09	ND		ND		ND	
WA:Seattle	10/07/94	1.67	0.09	ND		ND		ND	
WA:Spokane	10/10/94	1.58	0.08	ND		ND		ND	
WV:Charleston	10/03/94	1.63	0.11	ND		ND		ND	

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

Table 17
Radionuclides in Pasteurized Milk
November 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AL:Montgomery	11/10/94	1.63	0.09	ND		ND		ND	
AR:Little Rock	11/02/94	1.66	0.09	ND		ND		ND	
CA:Los Angeles	11/04/94	1.61	0.09	ND		ND		ND	
CA:Sacramento	11/01/94	1.61	0.09	ND		ND		ND	
CA:San Francisco	11/01/94	1.61	0.09	ND		ND		ND	
CO:Denver	11/20/94	1.39	0.10	ND		ND		ND	
DE:Wilmington	11/16/94	1.67	0.09	ND		ND		ND	
FL:Tampa	11/01/94	1.64	0.09	ND		ND		ND	
GA:Atlanta	11/09/94	1.60	0.09	ND		ND		ND	
HI:Honolulu	11/07/94	1.69	0.06	ND		ND		ND	
IA:Des Moines	11/07/94	1.56	0.09	ND		ND		ND	
IL:Chicago	11/04/94	1.61	0.09	ND		ND		ND	
IN:Indianapolis	11/07/94	1.63	0.09	ND		ND		ND	
KS:Wichita	11/21/94	1.63	0.09	ND		ND		ND	
KY:Louisville	11/08/94	1.62	0.09	ND		ND		ND	
MA:Boston	11/07/94	1.48	0.08	ND		ND		ND	
MD:Baltimore	11/04/94	1.66	0.09	ND		ND		ND	
MI:Detroit	11/10/94	1.63	0.09	ND		ND		ND	
MI:Grand Rapids	11/07/94	1.61	0.07	ND		ND		ND	
MN:St. Paul	11/02/94	1.64	0.09	ND		ND		ND	
MO:Kansas City	11/23/94	1.57	0.06	ND		ND		ND	
MS:Jackson	11/02/94	1.72	0.09	ND		ND		ND	
NC:Charlotte	11/10/94	1.64	0.09	ND		ND		ND	
ND:Minot	11/02/94	1.60	0.06	ND		ND		ND	
NJ:Trenton	11/09/94	1.63	0.09	ND		ND		ND	
NV:Las Vegas	11/01/94	1.64	0.08	ND		ND		ND	
NY:Buffalo	11/01/94	1.66	0.11	ND		ND		ND	
NY:Syracuse	11/07/94	1.57	0.06	ND		ND		ND	
OH:Cincinnati	11/15/94	1.72	0.09	ND		ND		ND	
OH:Cleveland	11/21/94	1.58	0.08	ND		ND		ND	
OR:Portland	11/07/94	1.63	0.09	ND		ND		ND	
PA:Philadelphia	11/07/94	1.63	0.09	ND		ND		ND	
PA:Pittsburgh	11/07/94	1.67	0.09	ND		ND		ND	
PC:Cristobal	11/15/94	1.64	0.11	9	4	ND		ND	
PR:San Juan	11/09/94	1.63	0.09	ND		ND		ND	
SC:Charleston	11/09/94	1.66	0.09	ND		ND		ND	
SD:Rapid City	11/07/94	1.63	0.09	ND		ND		ND	

Table 17 (continued)
Radionuclides in Pasteurized Milk
 November 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
TN:Chattanooga	11/15/94	1.68	0.09	ND		ND		ND	
TN:Knoxville	11/07/94	1.74	0.09	ND		ND		ND	
TN:Memphis	11/22/94	1.54	0.06	ND		ND		ND	
TX:Austin	11/01/94	1.64	0.06	ND		ND		ND	
TX:Ft. Worth	11/14/94	1.66	0.09	ND		ND		ND	
VA:Norfolk	11/30/94	1.65	0.06	ND		ND		ND	
VT:Burlington	11/14/94	1.58	0.09	ND		ND		ND	
WA:Seattle	11/04/94	1.61	0.06	ND		ND		ND	
WA:Spokane	11/09/94	1.67	0.09	ND		ND		ND	
WV:Charleston	11/07/94	1.60	0.09	ND		ND		ND	

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

Table 18
Radionuclides in Pasteurized Milk
December 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	±2σ	pCi/L	±2σ	pCi/L	±2σ	pCi/L	±2σ
AL:Montgomery	12/08/94	1.60	0.09	ND		ND		ND	
AR:Little Rock	12/06/94	1.50	0.09	ND		ND		ND	
AZ:Phoenix	12/13/94	1.54	0.09	ND		ND		ND	
CA:Los Angeles	12/09/94	1.69	0.09	ND		ND		ND	
CA:Sacramento	12/12/94	1.60	0.08	ND		ND		ND	
CA:San Francisco	12/05/94	1.62	0.09	ND		ND		ND	
CO:Denver	12/01/94	1.58	0.08	ND		ND		ND	
DE:Wilmington	12/09/94	1.62	0.09	ND		ND		ND	
FL:Tampa	12/06/94	1.66	0.09	ND		ND		ND	
GA:Atlanta	12/06/94	1.38	0.14	ND		ND		ND	
HI:Honolulu	12/05/94	1.66	0.09	ND		ND		ND	
IA:Des Moines	12/05/94	1.66	0.09	ND		ND		ND	
IL:Chicago	12/07/94	1.62	0.09	ND		ND		ND	
IN:Indianapolis	12/05/94	1.54	0.08	ND		ND		ND	
KS:Wichita	12/20/94	1.64	0.09	ND		ND		ND	
KY:Louisville	12/05/94	1.56	0.08	ND		ND		ND	
MA:Boston	12/09/94	1.57	0.09	ND		ND		ND	
MD:Baltimore	12/02/94	1.67	0.09	ND		ND		ND	
ME:Portland	12/12/94	1.62	0.09	ND		ND		ND	
MI:Detroit	12/07/94	1.67	0.09	ND		ND		ND	
MI:Grand Rapids	12/05/94	1.66	0.11	ND		ND		ND	
MN:St. Paul	12/07/94	1.71	0.08	ND		ND		ND	
MO:Kansas City	12/21/94	1.68	0.09	ND		ND		ND	
MS:Jackson	12/03/94	1.72	0.14	ND		ND		ND	
NC:Charlotte	12/06/94	1.66	0.09	ND		ND		ND	
ND:Minot	12/30/94	1.54	0.08	ND		ND		ND	
NJ:Trenton	12/06/94	1.58	0.09	ND		ND		ND	
NM:Albuquerque	12/19/94	1.55	0.08	ND		ND		ND	
NV:Las Vegas	12/06/94	1.57	0.06	ND		ND		ND	
NY:Buffalo	12/12/94	1.70	0.09	ND		ND		ND	
NY:Syracuse	12/05/94	1.69	0.09	ND		ND		ND	
OH:Cincinnati	12/05/94	1.54	0.08	ND		ND		ND	
OH:Cleveland	12/05/94	1.70	0.09	ND		ND		ND	
OR:Portland	12/05/94	1.58	0.11	ND		ND		ND	
PA:Philadelphia	12/06/94	1.64	0.09	ND		ND		ND	
PA:Pittsburgh	12/05/94	1.66	0.09	ND		ND		ND	
PC:Cristobal	12/06/94	1.53	0.08	7	2	ND		ND	

Table 18 (continued)
Radionuclides in Pasteurized Milk
 December 1994

Location	Date Collected	K		¹³⁷ Cs		¹⁴⁰ Ba		¹³¹ I	
		g/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
PR:San Juan	12/08/94	1.68	0.06	ND		ND		ND	
SC:Charleston	12/05/94	1.51	0.11	ND		ND		ND	
SD:Rapid City	12/05/94	1.62	0.06	ND		ND		ND	
TN:Chattanooga	12/04/94	1.62	0.08	ND		ND		ND	
TN:Knoxville	12/05/94	1.57	0.07	ND		ND		ND	
TN:Memphis	12/13/94	1.56	0.09	ND		ND		ND	
TX:Austin	12/12/94	1.56	0.08	ND		ND		ND	
TX:Ft. Worth	12/20/94	1.63	0.06	ND		ND		ND	
VT:Burlington	12/12/94	1.67	0.09	ND		ND		ND	
WA:Seattle	12/05/94	1.70	0.09	ND		ND		ND	
WA:Spokane	12/12/94	1.69	0.07	ND		ND		ND	
WV:Charleston	12/05/94	1.61	0.06	ND		ND		ND	

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

Table 19
Strontium-90 in Pasteurized Milk
EPA Regional Composites

October 1994

EPA Region	Collection Date	⁹⁰ Sr	
		pCi/L	$\pm 2\sigma$
I	10/12/94	1.7	0.4
II	10/07/94	0.9	0.4
III	10/10/94	1.2	0.4
IV	10/06/94	1.1	0.4
V	10/10/94	1.5	0.4
VI	10/13/94	1.3	0.4
VII	10/16/94	1.3	0.4
VIII	10/09/94	1.1	0.4
IX	10/07/94	0.6	0.3
X	10/07/94	1.5	0.4

Note: σ = Counting Error.

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

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

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