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ENVIRONMENTAL RADIATION DATA

REPORT 84

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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 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. It is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, drinking water, and milk samples.

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, and radionuclide-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 m^3. Measurement by alpha spectrometry includes combined activities of plutonium-239 and plutonium-240, since the relative contributions of these two isotopes cannot be determined.

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

‡‡ 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 the decay of natural radon isotopes and their progeny. 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 $1\,\mathrm{pCi/m^3}$. The laboratory obtained values are usually lower than the field estimates due to the decay of naturally occurring radionuclides between the times of the two measurements.

Precipitation samples are collected at 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 and -239/240, and for 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 1995. Tables 5–7 contain the data from precipitation samples for October–December 1995. Table 8 contains the data from tritium in precipitation samples for October–December 1995 at the selected sites.

Table 2

Gross Beta in Airborne Particulates

October 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	8	0.1	0.0	0.0	0.01	0.00	0.01
AK:Juneau	1	0.0	0.0	0.0	0.00	0.00	0.00
AL:Montgomery	9	0.5	0.0	0.1	0.08	0.01	0.02
AR:Little Rock	8	0.7	0.1	0.4	0.02	0.01	0.01
AZ:Phoenix	5	0.9	0.3	0.6	0.02	0.01	0.02
CA:Berkeley	9	0.1	0.1	0.1	0.01	0.00	0.01
CA:Los Angeles	8	0.3	0.0	0.2	0.03	0.02	0.02
CO:Denver	9	0.9	0.2	0.5	0.01	0.01	0.01
CT:Hartford	9	0.1	0.0	0.0	0.01	0.00	0.01
DE:Wilmington	9	0.5	0.1	0.2	0.02	0.01	0.01
FL:Jacksonville	9	0.1	0.0	0.0	0.01	0.00	0.01
FL:Miami	9	0.1	0.0	0.0	0.01	0.00	0.00
HI:Honolulu	9	0.2	0.1	0.1	0.01	0.00	0.00
IA:Iowa City	7	1.0	0.2	0.5	0.02	0.01	0.01
ID:Boise	9	1.2	0.3	0.6	0.01	0.00	0.01
ID:Idaho Falls	8	0.0	0.0	0.0	0.02	0.00	0.01
IL:Chicago	4	1.1	0.0	0.4	0.01	0.00	0.01
IN:Indianapolis	9	0.8	0.3	0.5	0.03	0.01	0.01
KS:Topeka	9	2.7	0.6	1.3	0.02	0.01	0.01
ME:Augusta	9	0.3	0.0	0.1	0.01	0.00	0.01
MI:Lansing	9	0.3	0.1	0.2	0.02	0.01	0.01
MN:Minneapolis	5	0.2	0.0	0.1	0.02	0.01	0.01
MN:Welch	2	0.0	0.0	0.0	0.03	0.00	0.01
MS:Jackson	9	0.5	0.1	0.3	0.02	0.01	0.01
NC:Charlotte	6	0.1	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	5	0.0	0.0	0.0	0.01	0.01	0.01
ND:Bismarck	8	1.0	0.0	0.6	0.02	0.00	0.01
NH:Concord	9	0.3	0.1	0.2	0.01	0.00	0.01
NJ:Trenton	9	1.9	0.1	0.6	0.02	0.00	0.01
NM:Santa Fe	3	0.4	0.1	0.2	0.02	0.01	0.02
NV:Las Vegas	9	0.3	0.1	0.2	0.03	0.01	0.02
NY:Albany	4	0.3	0.0	0.1	0.02	0.00	0.01
NY:Niagara Falls	9	0.2	0.1	0.1	0.02	0.01	0.01
NY:Yaphank	9	0.5	0.1	0.2	0.02	0.00	0.01
OH:Columbus	3	0.1	0.0	0.0	0.02	0.01	0.02
OH:Painesville	9	0.4	0.1	0.2	0.02	0.01	0.01
OH:Ross	9	0.0	0.0	0.0	0.03	0.01	0.02

Table 2 (continued)

Gross Beta in Airborne Particulates

October 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3) Max	Min	Avg	NAREL Lab Measurement (pCi/m^3) Max	Min	Avg
OH:Toledo	9	0.4	0.0	0.2	0.03	0.01	0.02
PA:Harrisburg	9	1.0	0.1	0.4	0.02	0.01	0.01
PA:Pittsburgh	9	0.3	0.1	0.2	0.04	0.01	0.02
SC:Barnwell	2	0.0	0.0	0.0	0.02	0.01	0.01
SC:Columbia	8	0.4	0.1	0.2	0.02	0.00	0.01
SD:Pierre	6	0.4	0.1	0.2	0.01	0.01	0.01
TN:Knoxville	3	0.4	0.2	0.3	0.02	0.01	0.01
TN:Nashville	9	0.9	0.1	0.2	0.02	0.01	0.01
TX:Austin	9	0.2	0.1	0.1	0.02	0.01	0.01
TX:El Paso	9	1.1	0.5	0.8	0.03	0.01	0.02
UT:Salt Lake City	9	0.4	0.0	0.2	0.02	0.00	0.01
VA:Lynchburg	9	1.6	0.3	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	9	0.3	0.0	0.1	0.01	0.00	0.00
WA:Spokane	9	0.3	0.1	0.2	0.01	0.00	0.01
WI:Madison	9	0.4	0.1	0.2	0.02	0.01	0.01

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

Table 3

Gross Beta in Airborne Particulates

November 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	5	0.1	0.0	0.0	0.03	0.01	0.02
AL:Montgomery	8	0.3	0.0	0.1	0.02	0.01	0.01
AR:Little Rock	8	0.7	0.1	0.3	0.03	0.01	0.02
AZ:Phoenix	4	1.3	0.4	0.9	0.05	0.01	0.03
CA:Berkeley	7	0.2	0.1	0.1	0.02	0.00	0.01
CA:Los Angeles	7	0.4	0.1	0.2	0.04	0.01	0.03
CO:Denver	6	0.9	0.1	0.6	0.02	0.01	0.01
CT:Hartford	8	0.1	0.0	0.0	0.01	0.00	0.01
DE:Wilmington	8	0.1	0.0	0.1	0.02	0.01	0.01
FL:Jacksonville	4	0.1	0.0	0.0	0.01	0.01	0.01
FL:Miami	9	0.1	0.0	0.0	0.01	0.00	0.01
HI:Honolulu	6	0.2	0.1	0.1	0.00	0.00	0.00
IA:Iowa City	7	0.8	0.1	0.4	0.03	0.01	0.02
ID:Boise	7	1.0	0.1	0.3	0.03	0.01	0.01
ID:Idaho Falls	8	0.0	0.0	0.0	0.02	0.00	0.01
IL:Chicago	4	0.5	0.1	0.2	0.03	0.01	0.02
IN:Indianapolis	7	0.4	0.0	0.3	0.02	0.01	0.02
KS:Topeka	8	2.2	0.6	1.1	0.02	0.01	0.02
ME:Augusta	5	0.0	0.0	0.0	0.01	0.01	0.01
MI:Lansing	9	0.2	0.1	0.1	0.02	0.01	0.01
MN:Minneapolis	4	0.3	0.0	0.1	0.03	0.02	0.02
MS:Jackson	7	0.3	0.0	0.1	0.02	0.01	0.02
NC:Charlotte	7	0.1	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	5	0.4	0.2	0.2	0.02	0.01	0.02
NH:Concord	7	0.1	0.0	0.1	0.01	0.00	0.01
NJ:Trenton	8	0.2	0.1	0.1	0.01	0.01	0.01
NM:Santa Fe	4	0.4	0.1	0.2	0.01	0.01	0.01
NV:Las Vegas	8	0.5	0.0	0.3	0.04	0.01	0.02
NY:Albany	4	0.1	0.0	0.1	0.01	0.01	0.01
NY:Niagara Falls	7	0.8	0.1	0.2	0.01	0.01	0.01
NY:Yaphank	8	0.1	0.0	0.1	0.02	0.00	0.01
OH:Columbus	5	0.3	0.1	0.1	0.01	0.01	0.01
OH:Painesville	8	0.8	0.0	0.2	0.02	0.01	0.01
OH:Ross	7	0.0	0.0	0.0	0.02	0.01	0.02
OH:Toledo	9	0.3	0.0	0.2	0.02	0.01	0.02
OR:Portland	3	0.0	0.0	0.0	0.00	0.00	0.00

Table 3 (continued)

Gross Beta in Airborne Particulates

November 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3) Max	Min	Avg	NAREL Lab Measurement (pCi/m^3) Max	Min	Avg
PA:Harrisburg	9	0.2	0.1	0.1	0.02	0.01	0.01
PA:Pittsburgh	8	0.1	0.1	0.1	0.02	0.01	0.02
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	6	0.3	0.1	0.1	0.02	0.01	0.01
SD:Pierre	6	0.3	0.0	0.1	0.02	0.01	0.02
TN:Knoxville	3	0.2	0.2	0.2	0.03	0.00	0.02
TN:Nashville	8	0.2	0.1	0.2	0.02	0.01	0.02
TX:Austin	8	0.2	0.1	0.1	0.02	0.01	0.01
TX:El Paso	7	1.4	0.4	1.0	0.03	0.01	0.02
UT:Salt Lake City	9	0.4	0.1	0.2	0.03	0.01	0.01
VA:Lynchburg	8	0.8	0.3	0.5	0.01	0.01	0.01
VA:Virginia Beach	2	0.0	0.0	0.0	0.01	0.01	0.01
WA:Olympia	6	0.2	0.0	0.1	0.01	0.00	0.00
WA:Spokane	9	0.3	0.0	0.1	0.02	0.00	0.01
WI:Madison	8	0.4	0.1	0.2	0.02	0.01	0.02

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

Table 4

Gross Beta in Airborne Particulates

December 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
AK:Fairbanks	4	0.0	0.0	0.0	0.04	0.02	0.03
AL:Montgomery	5	0.2	0.0	0.1	0.02	0.01	0.01
AR:Little Rock	7	0.2	0.1	0.2	0.02	0.01	0.01
AZ:Phoenix	4	2.1	0.0	0.9	0.04	0.01	0.03
CA:Berkeley	9	0.3	0.0	0.1	0.02	0.00	0.01
CA:Los Angeles	9	0.6	0.1	0.3	0.04	0.01	0.02
CO:Denver	8	2.3	0.2	0.8	0.03	0.01	0.01
CT:Hartford	7	0.0	0.0	0.0	0.01	0.00	0.01
DE:Wilmington	9	0.1	0.0	0.1	0.02	0.01	0.01
FL:Jacksonville	4	0.1	0.0	0.0	0.02	0.01	0.01
FL:Miami	7	0.2	0.0	0.1	0.02	0.00	0.01
HI:Honolulu	8	0.2	0.1	0.2	0.00	0.00	0.00
IA:Iowa City	6	0.5	0.0	0.2	0.03	0.01	0.02
ID:Boise	9	0.4	0.1	0.2	0.07	0.00	0.02
ID:Idaho Falls	7	0.0	0.0	0.0	0.03	0.00	0.01
IN:Indianapolis	9	0.9	0.1	0.4	0.03	0.01	0.02
KS:Topeka	6	2.2	0.4	1.0	0.03	0.02	0.02
ME:Augusta	9	0.1	0.0	0.0	0.02	0.00	0.01
MI:Lansing	8	0.1	0.0	0.1	0.03	0.01	0.02
MN:Minneapolis	4	0.1	0.1	0.1	0.03	0.02	0.03
MN:Welch	7	0.1	0.0	0.0	0.04	0.01	0.02
MS:Jackson	8	0.2	0.0	0.1	0.02	0.01	0.02
NC:Charlotte	7	0.1	0.0	0.1	0.02	0.01	0.01
NC:Wilmington	4	0.0	0.0	0.0	0.02	0.01	0.01
ND:Bismarck	5	0.1	0.1	0.1	0.04	0.01	0.02
NH:Concord	9	0.1	0.0	0.0	0.01	0.00	0.01
NJ:Trenton	8	0.4	0.0	0.1	0.01	0.00	0.01
NM:Santa Fe	3	0.2	0.0	0.1	0.01	0.01	0.01
NV:Las Vegas	4	0.3	0.1	0.2	0.04	0.01	0.03
NY:Albany	3	0.1	0.0	0.0	0.01	0.01	0.01
NY:Niagara Falls	9	0.2	0.0	0.1	0.02	0.01	0.01
NY:Yaphank	8	0.1	0.0	0.0	0.01	0.01	0.01
OH:Columbus	4	0.1	0.1	0.1	0.01	0.01	0.01
OH:Painesville	6	0.1	0.0	0.1	0.02	0.01	0.01
OH:Ross	9	0.0	0.0	0.0	0.02	0.01	0.02
OH:Toledo	8	0.2	0.1	0.1	0.03	0.01	0.02
OR:Portland	4	0.3	0.0	0.1	0.03	0.00	0.01

Table 4 (continued)

Gross Beta in Airborne Particulates

December 1995

Location	Number of Samples	5-Hour Field Estimate (pCi/m^3)			NAREL Lab Measurement (pCi/m^3)		
		Max	Min	Avg	Max	Min	Avg
PA:Harrisburg	8	0.2	0.0	0.1	0.02	0.01	0.02
PA:Pittsburgh	9	0.0	0.0	0.0	0.03	0.01	0.02
SC:Barnwell	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:Columbia	8	0.3	0.1	0.2	0.02	0.01	0.01
SD:Pierre	8	0.3	0.1	0.2	0.05	0.01	0.02
TN:Knoxville	3	0.2	0.0	0.1	0.03	0.01	0.02
TX:Austin	7	0.4	0.1	0.2	0.03	0.01	0.02
TX:El Paso	8	1.7	0.3	1.2	0.06	0.01	0.03
UT:Salt Lake City	6	0.1	0.1	0.1	0.06	0.00	0.02
VA:Lynchburg	6	0.6	0.2	0.4	0.02	0.01	0.01
VA:Virginia Beach	1	0.0	0.0	0.0	0.02	0.02	0.02
WA:Olympia	9	0.1	0.0	0.1	0.03	0.00	0.01
WA:Spokane	8	0.2	0.1	0.1	0.06	0.00	0.02
WI:Madison	9	0.3	0.0	0.2	0.03	0.01	0.02

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

Table 5

Gross Beta and Specific Gamma in Precipitation

October 1995

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L	$\pm 2\sigma$
AK:Fairbanks	21.4	0.01	0.01	ND	
AL:Montgomery	115.0	0.11	0.04	ND	
AR:Little Rock	103.0	0.12	0.03	ND	
AZ:Phoenix	28.0	0.01	0.01	ND	
CO:Denver	57.2	0.11	0.02	ND	
CT:Hartford	156.0	0.06	0.04	ND	
DE:Wilmington	196.0	0.08	0.05	ND	
FL:Jacksonville	212.4	0.11	0.06	ND	
FL:Miami	235.4	0.15	0.07	ND	
HI:Honolulu	26.0	0.01	0.01	ND	
IA:Iowa City	34.4	0.03	0.01	ND	
ID:Idaho Falls	4.6	0.04	0.00	ND	
IL:Chicago	89.2	0.06	0.03	ND	
ME:Augusta	132.0	0.15	0.04	ND	
MI:Lansing	71.4	0.07	0.02	ND	
MN:Minneapolis	131.0	0.16	0.04	^{214}Bi: 8.2±6.8	
MN:Welch	37.8	0.14	0.02	^{214}Bi: 16.0±7.3	
				^{214}Pb: 7.3±6.9	
MS:Jackson	42.0	0.03	0.01	ND	
NC:Charlotte	111.2	0.13	0.03	ND	
NC:Wilmington	50.8	0.02	0.01	ND	
ND:Bismarck	16.6	0.04	0.01	ND	
NE:Lincoln	8.0	0.00	0.00	ND	
NH:Concord	201.2	0.16	0.05	ND	
NJ:Trenton	146.8	0.12	0.04	ND	
NY:Albany	122.8	0.04	0.03	ND	
NY:Yaphank	32.0	0.04	0.01	ND	
OH:Painesville	87.6	0.12	0.03	ND	
OH:Toledo	74.0	0.24	0.03	ND	
PA:Harrisburg	117.4	0.07	0.03	^{7}Be: 26.0±19.4	
SC:Barnwell	34.6	0.11	0.02	^{7}Be: 43.7±26.6	
SC:Columbia	83.8	0.07	0.02	ND	
TN:Knoxville	112.4	0.10	0.04	ND	
TN:Nashville	75.0	0.12	0.03	ND	
UT:Salt Lake City	28.2	0.13	0.02	ND	
VA:Lynchburg	30.0	0.16	0.02	ND	
WA:Olympia	171.2	0.11	0.04	ND	
WI:Madison	75.6	0.09	0.02	ND	

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

Table 6

Gross Beta and Specific Gamma in Precipitation

November 1995

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L $\pm 2\sigma$
AL:Montgomery	88.2	0.07	0.02	^{40}K: 81.8±39.6
AR:Little Rock	39.0	0.07	0.01	ND
AZ:Phoenix	42.0	0.02	0.01	ND
CT:Hartford	60.0	0.08	0.02	^{7}Be: 61.1±29.2
DE:Wilmington	90.0	0.30	0.04	^{7}Be: 98.7±42.3
FL:Jacksonville	39.8	0.03	0.01	^{214}Bi: 7.1±5.9
FL:Miami	89.8	0.16	0.03	ND
HI:Honolulu	22.0	0.06	0.01	ND
IA:Iowa City	42.4	0.08	0.02	ND
ID:Boise	28.0	0.02	0.01	ND
ID:Idaho Falls	17.0	0.04	0.01	ND
IL:Chicago	48.4	0.09	0.02	ND
MI:Lansing	10.6	0.01	0.00	ND
MN:Minneapolis	11.0	0.01	0.00	ND
MS:Jackson	84.0	0.02	0.02	^{214}Bi: 9.5±6.8
NC:Charlotte	139.0	0.11	0.04	ND
NC:Wilmington	60.6	0.06	0.02	ND
ND:Bismarck	17.2	0.01	0.00	ND
NH:Concord	63.8	0.09	0.02	ND
NJ:Trenton	0.0	0.00	0.00	^{7}Be: 60.8±41.8
NY:Albany	83.4	0.46	0.05	^{7}Be: 55.6±43.4
NY:Yaphank	40.0	0.07	0.01	^{7}Be: 69.5±47.1
OH:Painesville	125.4	0.33	0.05	^{7}Be: 47.1±42.1
OH:Toledo	68.0	0.37	0.04	ND
PA:Harrisburg	124.6	0.20	0.04	ND
SC:Barnwell	84.0	0.09	0.03	ND
SC:Columbia	60.4	0.05	0.02	ND
TN:Nashville	109.2	0.08	0.03	ND
TX:Austin	100.0	0.12	0.03	ND
UT:Salt Lake City	13.8	0.03	0.01	ND
VA:Lynchburg	115.0	0.45	0.05	ND
WA:Olympia	204.4	0.10	0.05	ND
WI:Madison	68.6	0.11	0.02	ND

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

Table 7

Gross Beta and Specific Gamma in Precipitation

December 1995

Location	Depth (mm)	Gross Beta Activity nCi/m^2	$\pm 2\sigma$	Specific Gamma Activity pCi/L	$\pm 2\sigma$
AL:Montgomery	67.0	0.03	0.02	ND	
AR:Little Rock	33.0	0.03	0.01	ND	
CA:Berkeley	141.4	0.02	0.04	^{212}Bi:	30.7±29.1
CT:Hartford	40.0	0.13	0.02	ND	
DE:Wilmington	66.0	0.13	0.02	ND	
FL:Jacksonville	67.4	0.05	0.02	ND	
FL:Miami	14.0	0.04	0.01	ND	
HI:Honolulu	33.0	0.05	0.01	ND	
IA:Iowa City	5.6	0.01	0.00	^{208}Tl:	2.5±2.2
				^{7}Be:	100±53
ID:Boise	42.0	0.03	0.01	ND	
MS:Jackson	84.0	0.05	0.02	ND	
NC:Charlotte	30.0	0.07	0.01	ND	
NC:Wilmington	11.0	0.03	0.00	ND	
ND:Bismarck	9.2	0.05	0.01	^{7}Be:	158±52
NJ:Trenton	38.0	0.07	0.01	ND	
NY:Albany	33.0	0.09	0.01	ND	
NY:Yaphank	17.0	0.03	0.01	ND	
OH:Painesville	21.0	0.12	0.01	^{7}Be:	179±46
OH:Toledo	15.2	0.04	0.01	^{7}Be:	129±46
				^{224}Ra:	56.8±42.7
				^{212}Pb:	6.9±4.6
OR:Portland	47.2	0.05	0.02	^{7}Be:	37.4±34.5
PA:Harrisburg	70.4	0.24	0.03	ND	
SC:Barnwell	84.0	0.10	0.03	ND	
SC:Columbia	54.2	0.10	0.02	ND	
TN:Knoxville	41.0	0.04	0.01	ND	
UT:Salt Lake City	5.8	0.01	0.00	ND	
VA:Lynchburg	50.6	0.24	0.03	ND	
WA:Olympia	209.8	0.13	0.07	ND	
WI:Madison	46.4	0.17	0.02	ND	

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

Table 8

Tritium in Precipitation

October–December 1995

Location	October 1995 nCi/L	October 1995 $\pm 2\sigma$	November 1995 nCi/L	November 1995 $\pm 2\sigma$	December 1995 nCi/L	December 1995 $\pm 2\sigma$
AK:Fairbanks	0.1	0.1	NS		NS	
AL:Montgomery	ND		ND		0.0	0.1
AR:Little Rock	0.0	0.1	0.0	0.1	0.0	0.1
AZ:Phoenix	0.0	0.1	0.0	0.1	NS	
CA:Berkeley	NS		NS		ND	
CO:Denver	0.1	0.1	NS		NS	
CT:Hartford	0.0	0.1	0.0	0.1	0.0	0.1
DE:Wilmington	0.0	0.1	0.0	0.1	0.3	0.1
FL:Jacksonville	0.0	0.1	0.0	0.1	0.0	0.1
FL:Miami	0.0	0.1	0.0	0.1	0.0	0.1
HI:Honolulu	0.0	0.1	0.0	0.1	0.0	0.1
IA:Iowa City	0.0	0.1	0.0	0.1	0.0	0.1
ID:Boise	NS		0.0	0.1	0.0	0.1
ID:Idaho Falls	0.0	0.1	0.0	0.1	NS	
IL:Chicago	0.0	0.1	0.0	0.1	NS	
ME:Augusta	0.1	0.1	NS		NS	
MI:Lansing	0.1	0.1	0.0	0.1	NS	
MN:Minneapolis	0.0	0.1	0.0	0.1	NS	
MN:Welch	0.0	0.1	NS		NS	
MS:Jackson	0.0	0.1	0.0	0.1	0.1	0.1
NC:Charlotte	0.0	0.1	0.0	0.1	0.0	0.1
NC:Wilmington	0.1	0.1	0.1	0.1	0.0	0.1
ND:Bismarck	0.0	0.1	0.1	0.1	0.0	0.1
NE:Lincoln	0.0	0.1	NS		NS	
NH:Concord	0.0	0.1	0.0	0.1	NS	
NJ:Trenton	0.0	0.1	0.0	0.1	0.0	0.1
NY:Albany	0.0	0.1	0.0	0.1	0.0	0.1
NY:Yaphank	0.0	0.1	0.1	0.1	0.2	0.1
OH:Painesville	0.0	0.1	0.0	0.1	0.1	0.1
OH:Toledo	0.0	0.1	0.1	0.1	0.0	0.1
OR:Portla Nd	NS		NS		0.0	0.1
PA:Harrisburg	0.0	0.1	0.0	0.1	0.0	0.1
SC:Barnwell	0.4	0.1	0.2	0.1	0.1	0.1
SC:Columbia	0.0	0.1	0.0	0.1	0.1	0.1
TN:Knoxville	0.0	0.1	NS		0.0	0.1
TN:Nashville	0.0	0.1	0.0	0.1	NS	
TX:Austin	NS		0.0	0.1	NS	
UT:Salt Lake City	0.0	0.1	0.0	0.1	0.0	0.1
VA:Lynchburg	0.0	0.1	0.0	0.1	0.1	0.1
WA:Olympia	0.0	0.1	0.1	0.1	0.0	0.1
WI:Madison	0.1	0.1	0.0	0.1	0.0	0.1

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 and -239/240 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 1995.

Table 9

Plutonium and Uranium In Airborne Particulates

July–December 1995 Composites

Location	^{238}Pu		$^{239/240}$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	0.7	0.5	0.2	0.2	14.5	2.4	0.1	0.4	10.9	2.1
AK:Juneau	0.1	0.2	0.2	0.2	3.4	0.9	0.4	0.3	3.0	0.8
AL:Montgomery	ND		0.1	0.2	13.0	2.1	1.6	0.8	16.4	2.4
AR:Little Rock	ND		0.2	0.3	40.0	5.3	3.0	1.4	36.1	5.0
AZ:Phoenix	0.7	2.3	0.3	0.7	53.5	8.2	4.5	2.4	52.4	8.1
CA:Berkeley	ND		ND		10.6	1.9	1.2	0.7	10.7	1.9
CA:Los Angeles	0.7	0.8	0.9	0.8	35.7	4.5	3.4	1.3	33.1	4.3
CO:Denver	ND		0.4	0.5	26.7	3.6	2.7	1.1	31.1	3.9
CT:Hartford	ND		0.1	0.1	6.3	1.0	0.5	0.3	6.1	1.0
DE:Wilmington	0.5	0.6	ND		18.5	3.1	1.3	0.9	18.9	3.2
FL:Jacksonville	0.1	0.3	ND		9.7	1.2	0.6	0.3	9.3	1.1
FL:Miami	ND		ND		9.7	1.1	0.5	0.2	8.8	1.0
HI:Honolulu	0.2	0.4	0.1	0.2	6.0	1.3	0.6	0.5	3.4	1.0
IA:Iowa City	0.9	1.0	1.1	0.8	17.0	3.2	2.0	1.1	18.3	3.3
ID:Boise	0.4	0.5	0.5	0.4	30.2	4.0	1.4	0.9	25.4	3.6
ID:Idaho Falls	0.3	0.4	0.3	0.3	22.9	3.0	1.5	0.8	22.3	2.9
IL:Chicago	ND		0.2	0.4	18.9	2.8	1.8	0.9	21.8	3.1
IN:Indianapolis	0.3	0.5	ND		24.7	3.6	1.9	1.0	27.0	3.8
KS:Topeka	0.7	0.7	1.4	0.7	23.4	3.7	1.2	0.9	21.0	3.4
KY:Frankfort	0.5	1.5	0.4	0.8	15.1	4.0	1.0	1.3	15.4	4.1
ME:Augusta	0.2	0.3	ND		9.3	1.3	0.7	0.4	8.8	1.3
MI:Lansing	ND		ND		12.4	1.7	0.8	0.4	9.6	1.5
MN:Minneapolis	0.3	0.6	ND		12.9	2.3	1.8	0.9	11.6	2.1
MN:Welch	ND		0.5	0.5	19.4	3.6	1.2	1.0	17.5	3.3
MS:Jackson	0.2	0.3	0.2	0.2	13.3	2.1	1.1	0.6	11.2	1.9
NC:Charlotte	ND		ND		17.5	2.5	1.3	0.7	17.6	2.5
NC:Wilmington	0.1	0.3	ND		7.9	1.1	0.5	0.3	7.1	1.0
ND:Bismarck	0.2	0.3	0.2	0.2	15.3	2.1	0.6	0.4	16.1	2.2
NH:Concord	ND		0.1	0.1	7.6	1.1	0.6	0.3	6.8	1.0
NJ:Trenton	0.1	0.3	0.2	0.2	5.7	0.9	0.4	0.2	6.1	0.9
NM:Santa Fe	ND		0.2	0.2	15.7	2.2	1.3	0.6	17.0	2.3
NV:Las Vegas	ND		0.3	0.6	115	12	9.5	3.2	78.8	9.7
NY:Albany	0.2	0.2	0.1	0.2	12.6	2.1	0.6	0.5	14.2	2.2
NY:Niagara Falls	ND		0.1	0.2	34.7	3.4	3.7	1.1	37.7	3.6
NY:Yaphank	ND		ND		6.4	0.9	0.7	0.3	6.9	0.9
OH:Columbus	0.3	0.4	0.5	0.3	10.9	1.6	0.6	0.4	9.5	1.4
OH:Painesville	0.1	0.4	ND		14.1	1.7	1.2	0.5	12.9	1.6

Table 9 (continued)

Plutonium and Uranium In Airborne Particulates

July–December 1995 Composites

Location	^{238}Pu aCi/m^3	$\pm 2\sigma$	$^{239/240}$Pu aCi/m^3	$\pm 2\sigma$	^{234}U aCi/m^3	$\pm 2\sigma$	^{235}U aCi/m^3	$\pm 2\sigma$	^{238}U aCi/m^3	$\pm 2\sigma$
OH:Ross	ND		0.1	0.6	46.9	8.4	3.9	2.6	46.6	8.3
OH:Toledo	0.1	0.3	0.8	0.6	22.9	3.1	1.6	0.8	20.3	2.9
OR:Portland	0.3	0.3	0.2	0.2	11.6	2.2	1.8	0.9	8.8	1.9
PA:Harrisburg	0.3	0.3	ND		9.8	1.2	0.8	0.3	8.7	1.1
PA:Pittsburgh	ND		ND		21.0	2.7	1.7	0.8	21.9	2.7
SC:Barnwell	0.3	0.2	0.2	0.2	9.8	1.2	0.8	0.4	11.3	1.4
SC:Columbia	0.2	0.3	0.1	0.2	19.4	1.9	0.9	0.4	18.3	1.8
SD:Pierre	0.2	0.4	0.2	0.2	13.4	2.2	1.0	0.6	14.0	2.2
TN:Knoxville	0.1	0.7	0.1	0.4	17.9	2.5	1.5	0.7	16.6	2.4
TN:Nashville	0.1	0.5	ND		16.7	2.4	2.6	1.0	17.0	2.5
TX:Austin	0.1	0.2	0.2	0.2	12.7	2.4	1.8	0.9	10.7	2.1
TX:El Paso	0.9	1.1	ND		56.0	8.0	4.2	2.2	48.6	7.3
UT:Salt Lake City	1.6	1.3	0.9	0.8	39.9	5.6	2.4	1.3	35.1	5.2
VA:Lynchburg	0.1	0.1	0.1	0.1	96.2	5.1	3.6	0.7	8.4	1.0
VA:Virginia Beach	0.3	0.4	ND		15.0	1.6	1.3	0.5	13.2	1.5
WA:Olympia	0.3	0.2	0.1	0.1	4.4	0.8	0.4	0.3	3.4	0.7
WA:Spokane	0.4	0.4	0.3	0.3	21.6	3.0	1.2	0.7	16.4	2.6
WI:Madison	ND		ND		12.4	1.8	0.8	0.5	12.5	1.8

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 potential 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 1995. Table 11 contains the surface water annual gamma results for January–December 1995.

Table 10

Tritium in Surface Water

October–December 1995

Location	Source	Date Collected	^{3}H nCi/L	$\pm 2\sigma$
AL:Decatur	Tennessee River	10/03/95	0.1	0.1
AL:Scottsboro	Tennessee River	10/04/95	ND	
AR:Little Rock	Arkansas River	10/03/95	ND	
CA:Clay Station	Folsom S. Canal	10/10/95	0.1	0.1
CA:Diablo Canyon	Pacific Ocean	10/11/95	0.0	0.1
CA:Eureka	Humboldt Bay	10/12/95	ND	
CA:San Onofre	Pacific Ocean	12/30/95	ND	
CO:Platteville	South Platte River	10/04/95	0.0	0.1
CT:East Haddam	Connecticut River	10/24/95	0.1	0.1
CT:Waterford	Long Island Sound	10/10/95	0.0	0.1
FL:Crystal River	Gulf Of Mexico	10/10/95	0.0	0.1
FL:Ft. Pierce	Atlantic Ocean	10/09/95	0.0	0.1
FL:Homestead	Biscayne Bay	11/08/95	0.1	0.1
GA:Baxley	Altamaha River	10/03/95	0.0	0.1
ID:Buhl	Snake River	10/11/95	0.0	0.1
IL:Moline	Mississippi River	10/02/95	ND	
IL:Zion	Lake Michigan	10/07/95	0.2	0.1
KS:Le Roy	Neosho River	10/02/95	ND	
LA:New Orleans	Mississippi River	10/31/95	0.1	0.1
MA:Plymouth	Cape Cod Bay	11/03/95	0.0	0.1
MD:Conowingo	Susquehanna River	10/31/95	0.0	0.1
MD:Lusby	Chesapeake Bay	10/10/95	0.1	0.1
ME:Wiscasset	Montseway Bay	10/11/95	0.0	0.1
MI:Bridgman	Lake Michigan	10/09/95	0.1	0.1
MI:Charlevoix	Lake Michigan	10/05/95	0.0	0.1
MI:Monroe	Lake Erie	10/09/95	0.1	0.1
MI:South Haven	Lake Michigan	10/10/95	0.1	0.1
MN:Monticello	Mississippi River	10/19/95	0.0	0.1
MN:Red Wing	Mississippi River	10/25/95	0.1	0.1
MS:Port Gibson	Mississippi River	10/17/95	0.1	0.1
NC:Charlotte	Catawba River	10/11/95	0.3	0.1
NC:Southport	Atlantic Ocean	10/26/95	0.1	0.1
NE:Rulo	Missouri River	10/11/95	0.0	0.1
NJ:Bayside	Delaware River	10/24/95	ND	
NJ:Oyster Creek	Oyster Creek	10/19/95	ND	
NV:Boulder City	Colorado River	10/25/95	0.0	0.1
NY:Chelsea	Hudson River	10/04/95	ND	

Table 10 (continued)

Tritium in Surface Water

October–December 1995

Location	Source	Date Collected	^{3}H nCi/L	$\pm 2\sigma$
NY:Croton-On-Hudson	Hudson River	10/19/95	0.0	0.1
NY:Oswego	Lake Ontario	11/09/95	0.2	0.1
NY:Oswego	Lake Ontario	10/02/95	0.2	0.1
OH:Toledo	Lake Erie	10/17/95	0.1	0.1
OR:Bradwood	Columbia River	10/12/95	0.0	0.1
PA:Danville	Susquehanna River	11/01/95	0.0	0.1
PA:Philadelphia	Schuylkill R. - Belmont	10/25/95	0.0	0.1
PA:Philadelphia	Schuylkill R. - Queen	10/25/95	ND	
PA:Philadelphia	Delaware River	10/25/95	0.0	0.1
SC:Broad River	Broad River	10/09/95	ND	
SC:Columbia	Broad River	10/02/95	0.7	0.1
SC:Hartsville	Lake Robinson	10/09/95	1.5	0.1
TN:Daisy	Tennessee River	12/15/95	0.0	0.1
TN:Kingston	Clinch River	10/04/95	ND	
TN:Oak Ridge	Clinch River	11/15/95	0.2	0.1
TX:El Paso	Rio Grande	10/30/95	0.0	0.1
TX:Matagorda	Colorado River	10/30/95	0.0	0.1
VA:Doswell	North Anna River	10/04/95	1.7	0.2
VA:Newport News	James River	10/11/95	0.0	0.1
WA:Richland	Columbia River	10/09/95	0.2	0.1
WI:Two Creeks	Lake Michigan	10/04/95	0.1	0.1
WI:Victory	Mississippi River	10/09/95	0.2	0.1
WV:Wheeling	Ohio River	10/02/95	0.0	0.1

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

Table 11

Surface Water
Annual Gamma Analysis

January–December 1995

Location	Source	Date Collected	Specific Gamma Activity pCi/L $\pm 2\sigma$
AL:Decatur	Tennessee River	04/06/95	^{40}K: 28.8±28.5
AL:Decatur	Tennessee River	06/29/95	ND
AL:Gordon	Chattahoochee River	04/18/95	ND
AL:Scottsboro	Tennessee River	04/06/95	ND
AL:Scottsboro	Tennessee River	06/27/95	ND
AR:Little Rock	Arkansas River	04/11/95	ND
CA:Clay Station	Folsom S. Canal	04/11/95	ND
CA:Diablo Canyon	Pacific Ocean	04/05/95	^{40}K: 360±48
CA:Eureka	Humboldt Bay	04/06/95	^{40}K: 300±42
CA:San Onofre	Pacific Ocean	05/03/95	^{212}Pb: 12.9±8.2
			^{214}Bi: 31.8±7.3
			^{40}K: 340±51
CO:Platteville	South Platte River	04/13/95	^{131}I: 128±21
		10/04/95	^{214}Bi: 24.8±7.8
			^{131}I: 17.3±11.0
CT:East Haddam	Connecticut River	05/17/95	ND
CT:Waterford	Long Island Sound	05/17/95	^{40}K: 292±42
FL:Crystal River	Gulf Of Mexico	04/04/95	ND
FL:Ft. Pierce	Atlantic Ocean	04/12/95	ND
FL:Homestead	Biscayne Bay	04/13/95	^{40}K: 316±43
IA:Cedar Rapids	Cedar River	06/12/95	ND
IL:E. Moline	Mississippi River	04/03/95	^{214}Bi: 8.4±5.5
IL:Morris	Illinois River	04/06/95	ND
IL:Zion	Lake Michigan	05/15/95	^{214}Pb: 10.3±4.8
			^{214}Bi: 17.4±6.1
			^{212}Pb: 8.1±4.9
			ND
KS:Le Roy	Neosho River	06/28/95	ND
LA:New Orleans	Mississippi River	04/30/95	^{40}K: 59.1±37.7
MA:Plymouth	Cape Cod Bay	04/12/95	ND
			ND
MD:Conowingo	Susquehanna River	04/11/95	^{214}Bi: 8.1±5.4
MD:Lusby	Chesapeake Bay	04/10/95	^{40}K: 129±36
ME:Wiscasset	Montseway Bay	04/12/95	^{40}K: 185±47
MI:Bridgman	Lake Michigan	04/11/95	ND
MI:Charlevoix	Lake Michigan	04/06/95	ND
MI:Monroe	Lake Erie	04/11/95	ND

Table 11 (continued)

Surface Water
Annual Gamma Analysis

January–December 1995

Location	Source	Date Collected	Specific Gamma Activity pCi/L $\pm 2\sigma$
MI:South Haven	Lake Michigan	04/11/95	ND
MN:Monticello	Mississippi River	04/05/95	ND
MN:Red Wing	Mississippi River	04/12/95	ND
MN:Welch	Mississippi River	05/17/95	ND
MS:Port Gibson	Mississippi River	04/04/95	ND
NC:Charlotte	Catawba River	05/09/95	ND
NC:Southport	Atlantic Ocean	04/14/95	^{40}K: 245±62
NE:Rulo	Missouri River	04/18/95	ND
NJ:Bayside	Delaware River	04/11/95	^{40}K: 104±37
NJ:Oyster Creek	Oyster Creek	04/13/95	^{40}K: 203±37
NV:Boulder City	Colorado River	04/26/95	ND
NY:Chelsea	Hudson River	04/05/95	ND
NY:Croton-On-Hudson	Hudson River	04/05/95	ND
NY:Oswego	Lake Ontario	06/16/95	ND
OH:Toledo	Lake Erie	06/01/95	ND
OR:Bradwood	Columbia River	04/19/95	ND
PA:Danville	Susquehanna River	04/19/95	ND
PA:Philadelphia	Delaware River	04/18/95	ND
	Schuylkill R. - Belmont	04/18/95	ND
	Schuylkill R. - Queen	04/18/95	ND
SC:Allendale	Savannah River	04/28/95	ND
SC:Broad River	Broad River	04/28/95	ND
SC:Hartsville	Lake Robinson	04/10/95	^{212}Bi: 28.5±23.8
TN:Daisy	Tennessee River	04/18/95	ND
TN:Kingston	Clinch River	04/05/95	ND
TN:Oak Ridge	Clinch River	05/23/95	^{214}Bi: 13.0±5.8
TN:Oak Ridge	Clinch River	02/20/95	ND
TX:El Paso	Rio Grande	05/24/95	^{212}Pb: 5.2±4.0 ^{40}K: 45.5±32.3
TX:Matagorda	Colorado River	04/10/95	ND
VA:Doswell	North Anna River	04/05/95	ND
VA:Newport News	James River	04/07/95	^{40}K: 119±45
VT:Vernon	Connecticut River	04/10/95	^{212}Pb: 7.6±5.7
WA:Northport	Columbia River	05/02/95	ND
WA:Richland	Columbia River	04/03/95	ND
WI:Two Creeks	Lake Michigan	04/11/95	ND
WI:Victory	Mississippi River	04/11/95	ND
WV:Wheeling	Ohio River	04/03/95	ND

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 and -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.

Table 12 contains the data from drinking water samples for October–December 1995. Table 13 contains the data on gross alpha, gross beta, strontium-90, and radium-226 in drinking water for January–December 1995. Table 14 contains the plutonium and uranium in drinking water data for January–December 1995. Table 15 contains the I-131 in drinking water results for January–December 1995.

Table 12

Tritium in Drinking Water

October–December 1995

Location	Date Collected	^{3}H nCi/L	$\pm 2\sigma$
AK:Fairbanks	10/04/95	0.1	0.1
AL:Montgomery	10/31/95	0.1	0.1
AL:Muscle Shoals	10/03/95	0.0	0.1
AL:Scottsboro	10/04/95	0.0	0.1
AR:Little Rock	10/04/95	ND	
CA:Berkeley	12/13/95	0.0	0.1
CA:Los Angeles	10/03/95	0.0	0.1
CO:Denver	10/06/95	0.2	0.1
CO:Platteville	10/04/95	0.0	0.1
CT:Hartford	10/02/95	0.0	0.1
DC:Washington	10/04/95	0.0	0.1
DE:Dover	10/12/95	0.2	0.1
FL:Miami	10/02/95	0.0	0.1
GA:Baxley	10/03/95	0.2	0.1
GA:Savannah	11/07/95	0.0	0.1
HI:Honolulu	10/02/95	ND	
IA:Cedar Rapids	10/02/95	0.0	0.1
ID:Boise	10/06/95	0.2	0.1
ID:Idaho Falls	10/27/95	0.0	0.1
IL:Morris	10/11/95	0.1	0.1
KS:Topeka	10/02/95	0.0	0.1
LA:New Orleans	10/03/95	0.1	0.1
MA:Lawrence	10/02/95	0.0	0.1
MD:Baltimore	10/03/95	ND	
MD:Conowingo	10/31/95	0.0	0.1
ME:Augusta	10/05/95	ND	
MI:Detroit	10/10/95	0.3	0.1
MI:Grand Rapids	10/23/95	0.0	0.1
MN:Minneapolis	10/19/95	0.0	0.1
MN:Red Wing	10/11/95	0.1	0.1
MO:Jefferson City	10/02/95	0.0	0.1
MS:Jackson	10/17/95	0.0	0.1
MS:Port Gibson	10/17/95	0.0	0.1
MT:Helena	10/04/95	0.0	0.1
NC:Charlotte	10/11/95	0.3	0.1
NC:Wilmington	10/26/95	0.1	0.1
ND:Bismarck	10/03/95	0.2	0.1
NE:Lincoln	10/13/95	0.2	0.1
NH:Concord	10/05/95	0.0	0.1
NJ:Trenton	10/19/95	ND	
NJ:Waretown	10/19/95	ND	

Table 12 (continued)

Tritium in Drinking Water

October–December 1995

Location	Date Collected	^{3}H nCi/L	$\pm 2\sigma$
NM:Santa Fe	10/23/95	ND	
NV:Las Vegas	10/03/95	0.0	0.1
NY:Albany	10/02/95	0.0	0.1
NY:New York City	10/13/95	0.0	0.1
NY:Niagara Falls	10/03/95	0.1	0.1
OH:Cincinnati	11/30/95	0.1	0.1
OH:Columbus	10/27/95	0.0	0.1
OH:East Liverpool	12/15/95	0.1	0.1
OH:Painesville	10/17/95	0.1	0.1
OH:Toledo	10/25/95	0.2	0.1
OK:Oklahoma City	10/05/95	0.0	0.1
OR:Portland	12/07/95	0.0	0.1
PA:Columbia	11/02/95	0.0	0.1
PA:Harrisburg	11/02/95	0.0	0.1
PA:Philadelphia - Baxter	10/25/95	0.0	0.1
PA:Philadelphia - Belmont	10/25/95	0.0	0.1
PA:Philadelphia - Queen	10/25/95	0.0	0.1
PA:Pittsburgh	12/15/95	0.0	0.1
PC:Corozal	10/03/95	ND	
RI:Providence	10/05/95	0.0	0.1
SC:Barnwell	10/11/95	0.0	0.1
SC:Columbia	10/02/95	0.1	0.1
SC:Jenkinsville	10/16/95	0.1	0.1
SC:Seneca	10/12/95	0.2	0.1
TN:Chattanooga	10/04/95	0.0	0.1
TN:Knoxville	10/03/95	0.0	0.1
TX:Austin	10/23/95	0.0	0.1
VA:Doswell	12/27/95	0.0	0.1
VA:Lynchburg	10/05/95	0.1	0.1
WA:Richland	10/09/95	0.0	0.1
WA:Seattle	10/04/95	0.0	0.1
WI:Genoa City	10/09/95	0.1	0.1
WI:Madison	10/06/95	0.1	0.1

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

Table 13

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

January–December 1995 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L	±2σ	Gross Alpha pCi/L	±2σ	^{90}Sr pCi/L	±2σ	^{226}Ra pCi/L	±2σ	Specific Gamma Activity pCi/L ±2σ
AK:Fairbanks	162.0	4.2	0.8	0.6	0.7	0.0	0.2	NA		^{40}K: 17.1±15.1 ^{214}Bi: 7.4±3.2
AL:Dothan	160.0	2.0	0.8	ND		0.1	0.1	NA		^{214}Bi: 3.0±2.9
AL:Montgomery	55.2	1.9	0.6	0.5	0.6	0.1	0.2	NA		ND
AL:Muscle Shoals	82.0	1.9	0.6	ND		0.2	0.2	NA		^{208}Tl: 4.0±3.0
AL:Scottsboro	87.0	1.9	0.6	0.5	0.6	0.2	0.2	NA		ND
AR:Little Rock	28.8	1.4	0.6	0.2	0.4	0.0	0.2	NA		^{214}Bi: 8.9±3.2
CA:Berkeley	8.0	0.3	0.4	0.1	0.2	0.1	0.2	NA		ND
CA:Los Angeles	318.0	6.1	1.6	6.0	3.0	0.0	0.1	0.0	0.0	ND
CO:Denver	140.0	2.0	0.6	0.9	0.8	0.0	0.2	NA		^{212}Pb: 4.3±3.7 ^{214}Bi: 9.0±3.4
CO:Platteville	138.0	4.3	2.4	2.6	2.2	0.0	0.2	0.2	0.0	ND
CT:Hartford	36.6	0.9	0.7	0.2	0.5	0.3	0.2	NA		ND
DE:Dover	191.0	3.1	1.4	0.1	1.7	ND		NA		^{214}Bi: 3.9±3.8
FL:Miami	150.0	2.5	0.8	0.1	0.8	0.2	0.2	NA		ND
FL:Tampa	252.0	4.0	1.1	ND		0.3	0.2	NA		ND
GA:Baxley	165.0	3.8	0.7	4.7	1.7	0.0	0.2	1.8	0.0	ND
GA:Savannah	147.0	1.7	0.6	ND		ND		NA		^{212}Pb: 3.7±3.7
HI:Honolulu	208.0	1.9	0.7	0.0	0.6	0.1	0.1	NA		^{208}Tl: 3.1±2.9
IA:Cedar Rapids	121.0	3.2	0.6	0.1	0.4	0.1	0.2	NA		ND
ID:Boise	95.5	1.1	0.6	0.3	0.5	ND		NA		^{208}Tl: 3.2±2.9
ID:Idaho Falls	219.0	3.9	1.2	1.3	1.2	ND		NA		^{214}Bi: 6.0±3.2
†IL:Morris	474.0	16.6	3.1	18.3	6.5	ND		3.8	0.1	ND
‡IL:W. Chicago	337.0	11.2	1.8	24.1	5.2	0.1	0.1	4.8	0.1	^{214}Bi: 12.1±4.0 ^{212}Pb: 5.2±4.3
KS:Topeka	364.0	5.6	1.3	1.8	1.7	0.2	0.2	NA		ND
LA:New Orleans	226.0	5.6	1.1	1.4	1.5	0.2	0.2	NA		^{214}Bi: 10.6±3.2
MA:Lawrence	93.8	1.0	0.9	1.0	0.8	0.2	0.2	NA		ND
MD:Baltimore	89.8	2.2	0.9	ND		0.1	0.2	NA		ND
MD:Conowingo	155.0	2.0	0.9	ND		0.1	0.2	NA		ND
ME:Augusta	85.2	2.8	0.7	1.3	0.8	0.3	0.2	NA		^{40}K: 19.4±12.7
MI:Detroit	79.8	1.8	0.7	ND		0.4	0.2	NA		ND
MI:Grand Rapids	125.0	1.7	0.9	0.5	0.9	0.3	0.2	NA		^{214}Bi: 6.4±3.2
MN:Minneapolis	93.8	3.2	0.9	0.5	0.9	0.3	0.2	NA		ND
MN:Red Wing	238.0	8.5	1.4	11.1	3.5	0.0	0.2	NA		ND

Table 13 (continued)

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

January–December 1995 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L	±2σ	Gross Alpha pCi/L	±2σ	^{90}Sr pCi/L	±2σ	^{226}Ra pCi/L	±2σ	Specific Gamma Activity pCi/L ±2σ
MO:Jefferson City	283.0	6.6	1.1	1.5	1.4	0.0	0.2	NA		^{214}Bi: 6.2±3.3 ^{40}K: 19.4±15.7
MS:Jackson	86.8	2.2	0.6	0.5	0.8	0.2	0.2	NA		^{214}Bi: 11.8±4.0
MS:Port Gibson	313.0	5.6	1.3	2.5	2.1	0.0	0.1	0.4	0.0	^{40}K: 26.4±13.3
MT:Helena	61.8	1.6	0.5	0.4	0.4	0.1	0.2	NA		ND
NC:Charlotte	46.8	1.5	0.6	ND		0.1	0.2	NA		^{214}Bi: 4.9±3.1
NC:Wilmington	110.0	2.9	0.7	0.7	0.8	0.2	0.2	NA		^{214}Bi: 6.2±3.7
ND:Bismarck	329.0	4.3	1.0	0.2	0.9	0.0	0.2	NA		^{212}Pb: 3.8±3.6
NE:Lincoln	305.0	12.8	1.8	11.9	3.7	0.1	0.2	0.3	0.0	ND
NH:Concord	81.2	1.1	0.8	0.2	0.8	0.1	0.2	NA		ND
NJ:Trenton	92.7	1.7	0.7	0.0	0.5	0.1	0.2	NA		^{214}Bi: 5.8±3.2
NJ:Waretown	52.0	2.7	0.7	2.0	0.8	0.0	0.2	0.4	0.0	^{214}Bi: 4.5±3.9
NM:Santa Fe	279.0	9.7	1.6	12.8	3.7	ND		0.2	0.0	ND
NV:Las Vegas	248.0	6.5	2.1	22.5	5.4	0.1	0.2	0.2	0.0	^{214}Bi: 8.8±3.0
NY:Albany	68.8	1.3	0.6	0.0	0.5	0.3	0.2	NA		^{40}K: 42.7±13.8 ^{214}Bi: 5.5±4.1
NY:New York City	44.5	0.6	0.6	0.4	0.5	0.0	0.2	NA		ND
NY:Niagara Falls	99.2	1.8	0.7	0.9	0.9	0.5	0.2	NA		ND
NY:Syracuse	94.8	1.9	0.7	1.3	0.9	0.3	0.2	NA		ND
OH:Cincinnati	198.0	1.8	0.7	0.6	1.0	0.2	0.2	NA		^{214}Bi: 17.2±3.5 ^{214}Pb: 9.6±3.5
OH:Columbus	362.0	3.5	1.3	0.3	1.7	0.0	0.3	NA		^{214}Bi: 7.9±3.0 ^{208}Tl: 3.1±2.8
OH:East Liverpool	215.0	2.8	1.1	0.2	0.7	0.3	0.2	NA		^{208}Tl: 4.6±3.4 ^{214}Bi: 5.3±3.6
OH:Painesville	126.0	2.2	0.9	0.0	0.8	0.2	0.3	NA		^{212}Pb: 3.2±3.1 ^{214}Bi: 5.9±3.2
OH:Toledo	148.0	1.6	0.7	0.6	0.7	0.3	0.3	NA		ND
OK:Oklahoma City	62.6	2.6	0.6	0.8	0.5	0.3	0.2	NA		^{214}Bi: 13.2±3.3
OR:Portland	19.2	0.6	0.4	0.0	0.2	0.1	0.2	NA		^{212}Pb: 4.6±3.7 ^{208}Tl: 3.7±3.3 ^{214}Bi: 6.5±3.2
PA:Columbia	121.0	2.1	0.8	ND		0.1	0.2	NA		ND
PA:Harrisburg	51.2	1.0	0.7	0.5	0.6	0.1	0.2	NA		ND
PA:Philadelphia	165.0	3.6	0.9	0.2	1.1	0.0	0.2	NA		ND

Table 13 (continued)

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

January–December 1995 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L	±2σ	Gross Alpha pCi/L	±2σ	^{90}Sr pCi/L	±2σ	^{226}Ra pCi/L	±2σ	Specific Gamma Activity pCi/L ±2σ
PA:Philadelphia-Queen	207.0	3.7	1.0	1.8	1.5	0.1	0.2	NA		ND
PA:Philadelphia-Baxter	101.0	2.0	0.9	0.9	1.1	0.2	0.2	NA		ND
PA:Pittsburgh	178.0	2.4	0.7	0.8	1.0	0.2	0.2	NA		^{214}Bi: 9.4±3.1
PC:Corozal	71.6	0.6	0.5	0.0	0.6	0.1	0.2	NA		ND
RI:Providence	52.8	0.6	0.7	0.3	0.5	0.3	0.2	NA		^{40}K: 17.9±12.8
SC:Barnwell	73.6	1.9	0.6	0.2	0.5	0.0	0.2	NA		ND
SC:Columbia	28.2	1.3	0.5	0.4	0.4	0.0	0.2	NA		^{40}K: 29.1±13.6
										^{214}Bi: 16.3±4.2
SC:Jenkinsville	165.0	6.0	1.0	9.1	2.4	ND		0.8	0.0	ND
SC:Seneca	35.2	0.2	0.7	0.1	0.5	0.1	0.2	NA		^{214}Bi: 8.0±3.5
										^{40}K: 16.7±11.9
TN:Chattanooga	82.2	1.7	0.7	0.7	0.7	0.2	0.2	NA		^{208}Tl: 4.3±3.1
										^{214}Bi: 4.6±3.6
TN:Knoxville	93.8	1.8	0.7	0.3	0.8	0.0	0.2	NA		ND
TX:Austin	180.0	3.2	0.9	0.7	0.9	0.0	0.2	NA		^{214}Bi: 15.3±3.3
										^{214}Pb: 9.6±3.5
VA:Doswell	193.0	5.2	0.9	0.9	1.2	0.0	0.2	NA		ND
VA:Lynchburg	45.2	0.2	0.4	ND		0.1	0.2	NA		ND
VA:Virginia Beach	91.2	2.3	0.6	ND		0.3	0.2	NA		ND
WA:Richland	77.2	2.4	0.7	0.3	0.5	0.1	0.2	NA		ND
WA:Seattle	29.8	0.1	0.4	0.4	0.4	0.0	0.2	NA		ND
WI:Genoa City	194.0	1.6	0.6	2.2	1.3	ND		0.4	0.0	ND
WI:Madison	234.0	3.2	1.6	4.1	3.0	ND		0.6	0.0	ND

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

† Morris, IL 3.58 ± 0.54 pCi/L ^{228}Ra.

‡ W. Chicago, IL 3.38 ± 0.53 pCi/L ^{228}Ra.

Table 14

Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples

January–December 1995

Location	^{238}Pu		$^{239/240}$Pu		^{234}U		^{235}U		^{238}U	
	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$	pCi/L	$\pm 2\sigma$
CA:Los Angeles	0.006	0.017	ND		1.700	0.194	0.047	0.030	1.270	0.162
CO:Platteville	0.013	0.016	0.001	0.004	0.933	0.102	0.034	0.017	0.713	0.086
GA:Baxley	ND		ND		0.042	0.021	ND		0.031	0.019
IL:Morris	ND		ND		0.578	0.164	ND		0.058	0.053
IL:W. Chicago	ND		ND		0.880	0.205	0.034	0.038	0.109	0.071
MN:Red Wing	ND		0.001	0.004	0.269	0.058	0.015	0.014	0.038	0.021
MS:Port Gibson	ND		0.002	0.008	0.083	0.027	0.007	0.009	0.055	0.022
NE:Lincoln	ND		0.004	0.006	4.140	0.345	0.109	0.042	2.540	0.246
NJ:Waretown	0.001	0.018	0.010	0.010	0.009	0.010	ND		0.008	0.009
NM:Santa Fe	ND		ND		7.050	0.551	0.236	0.069	4.270	0.378
NV:Las Vegas	ND		ND		2.540	0.308	0.128	0.064	1.480	0.225
SC:Jenkinsville	ND		0.002	0.005	0.470	0.099	0.014	0.016	0.221	0.065
WI:Genoa City	0.002	0.011	ND		0.405	0.068	0.009	0.012	0.138	0.040
WI:Madison	ND		ND		1.710	0.178	0.025	0.017	0.378	0.070

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 1995

Location	Date Collected	pCi/L	$\pm 2\sigma$
AK:Fairbanks	07/10/95	ND	
AL:Dothan	07/11/95	ND	
AL:Montgomery	01/18/95	ND	
AL:Muscle Shoals	01/10/95	0.3	0.2
AL:Scottsboro	01/10/95	0.2	0.1
AR:Little Rock	07/05/95	ND	
CA:Berkeley	01/03/95	ND	
CA:Los Angeles	10/03/95	ND	
CO:Denver	07/20/95	ND	
CO:Platteville	01/11/95	0.2	0.3
CT:Hartford	07/03/95	ND	
DC:Washington	10/04/95	0.4	0.4
DE:Dover	01/05/95	ND	
FL:Miami	07/11/95	0.1	0.1
FL:Tampa	01/30/95	0.3	0.1
GA:Savannah	11/07/95	ND	
HI:Honolulu	07/03/95	ND	
IA:Cedar Rapids	01/17/95	ND	
ID:Boise	01/03/95	ND	
ID:Idaho Falls	07/25/95	0.2	0.2
IL:Morris	01/17/95	0.1	0.1
KS:Topeka	07/03/95	ND	
LA:New Orleans	07/06/95	ND	
MA:Lawrence	10/02/95	0.1	0.1
MD:Baltimore	01/06/95	ND	
MD:Conowingo	01/03/95	0.1	0.1
ME:Portland	01/10/95	ND	
MI:Detroit	01/05/95	ND	
MI:Grand Rapids	10/23/95	ND	
MN:Minneapolis	01/09/95	0.2	0.2
MN:Red Wing	01/18/95	ND	
MO:Jefferson City	07/03/95	0.1	0.1
MS:Jackson	01/10/95	0.2	0.3
MS:Port Gibson	01/10/95	0.2	0.3
MT:Helena	01/04/95	0.1	0.2
NC:Charlotte	01/18/95	0.1	0.3
NC:Wilmington	07/06/95	ND	
ND:Bismarck	01/03/95	0.1	0.1
NE:Lincoln	01/10/95	ND	
NH:Concord	10/05/95	ND	

Table 15 (continued)

Iodine-131 in Drinking Water

January–December 1995

Location	Date Collected	pCi/L	$\pm 2\sigma$
NJ:Trenton	07/05/95	ND	
NJ:Waretown	01/19/95	ND	
NM:Santa Fe	07/06/95	0.2	0.3
NV:Las Vegas	07/05/95	0.1	0.1
NY:Albany	01/04/95	ND	
NY:New York City	01/03/95	ND	
NY:Niagara Falls	01/03/95	0.1	0.1
NY:Syracuse	01/10/95	ND	
OH:Cincinnati	11/30/95	ND	
OH:Columbus	10/27/95	ND	
OH:East Liverpool	12/15/95	2.4	2.8
OH:Painesville	01/06/95	ND	
OH:Toledo	07/06/95	0.2	0.3
OK:Oklahoma City	10/05/95	ND	
OR:Portland	01/09/95	0.8	0.1
OR:Portland	12/07/95	ND	
PA:Columbia	01/05/95	ND	
PA:Harrisburg	01/06/95	0.1	0.2
PA:Philadelphia	02/03/95	0.4	0.3
PA:Philadelphia - Baxter	02/03/95	0.1	0.2
PA:Philadelphia - Queen	02/03/95	0.5	0.2
PA:Pittsburgh	12/15/95	3.1	2.6
PC:Corozal	07/05/95	ND	
RI:Providence	07/03/95	ND	
SC:Barnwell	01/12/95	0.3	0.2
SC:Columbia	07/07/95	0.1	0.3
SC:Jenkinsville	07/20/95	0.1	0.1
SC:Seneca	01/10/95	0.2	0.3
TN:Chattanooga	01/11/95	ND	
TN:Knoxville	07/05/95	ND	
TX:Austin	07/21/95	0.1	0.1
VA:Doswell	06/09/95	ND	
VA:Lynchburg	07/06/95	ND	
VA:Virginia Beach	01/03/95	ND	
WA:Richland	01/04/95	ND	
WA:Seattle	07/03/95	ND	
WI:Genoa City	07/10/95	ND	
WI:Madison	07/21/95	ND	

Note: 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 significant 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.

Note: As of the first quarter of 1995, NAREL has discontinued regional compositing of milk samples for strontium-90 analysis.

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 1995.

Table 16

Radionuclides in Pasteurized Milk

October 1995

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
AR:Little Rock	10/04/95	1.56	0.08	ND		ND		ND	
AZ:Phoenix	10/20/95	1.66	0.08	ND		ND		ND	
CA:Los Angeles	10/10/95	1.57	0.08	ND		ND		ND	
CA:Sacramento	10/23/95	1.61	0.08	ND		ND		ND	
CA:San Francisco	10/04/95	1.60	0.14	ND		ND		ND	
CO:Denver	10/16/95	1.49	0.08	ND		ND		ND	
DE:Wilmington	10/20/95	1.59	0.12	ND		ND		ND	
FL:Tampa	10/17/95	1.63	0.08	ND		ND		ND	
GA:Atlanta	10/31/95	1.63	0.08	ND		ND		ND	
HI:Honolulu	10/23/95	1.57	0.08	ND		ND		ND	
IA:Des Moines	10/02/95	1.55	0.08	ND		ND		ND	
IL:Chicago	10/20/95	1.56	0.14	ND		ND		ND	
IN:Indianapolis	10/11/95	1.67	0.09	ND		ND		ND	
KS:Wichita	10/17/95	1.57	0.08	ND		ND		ND	
KY:Louisville	10/09/95	1.56	0.09	ND		ND		ND	
MA:Boston	10/02/95	1.59	0.09	ND		ND		ND	
MD:Baltimore	10/05/95	1.68	0.09	ND		ND		ND	
ME:Portland	10/02/95	1.52	0.09	ND		ND		ND	
MI:Detroit	10/13/95	1.63	0.09	ND		ND		ND	
MI:Grand Rapids	10/02/95	1.72	0.08	ND		ND		ND	
MO:Kansas City	10/23/95	1.69	0.09	ND		ND		ND	
MS:Jackson	10/03/95	1.54	0.10	ND		ND		ND	
NC:Charlotte	10/03/95	1.63	0.09	ND		ND		ND	
ND:Minot	10/05/95	1.61	0.12	ND		ND		ND	
NJ:Trenton	10/05/95	1.62	0.09	ND		ND		ND	
NV:Las Vegas	10/04/95	1.63	0.08	ND		ND		ND	
NY:Buffalo	10/06/95	1.66	0.07	ND		ND		ND	
NY:Syracuse	10/03/95	1.60	0.08	ND		ND		ND	
OH:Cincinnati	10/11/95	1.63	0.12	ND		ND		ND	
OH:Cleveland	10/30/95	1.60	0.14	ND		ND		ND	
OR:Portland	10/02/95	1.60	0.08	ND		ND		ND	
PA:Philadelphia	10/04/95	1.55	0.09	ND		ND		ND	
PA:Pittsburgh	10/04/95	1.57	0.09	ND		ND		ND	
PC:Cristobal	10/26/95	1.51	0.05	7	1	ND		ND	
PR:San Juan	10/06/95	1.59	0.08	ND		ND		ND	
SC:Charleston	10/03/95	1.63	0.08	ND		ND		ND	
TN:Chattanooga	10/02/95	1.59	0.08	ND		ND		ND	

Table 16 (continued)

Radionuclides in Pasteurized Milk

October 1995

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:Knoxville	10/02/95	1.55	0.14	ND		ND		ND	
TN:Memphis	10/12/95	1.60	0.08	ND		ND		ND	
TX:Ft. Worth	10/16/95	1.55	0.12	ND		ND		ND	
VA:Norfolk	10/29/95	1.51	0.08	ND		ND		ND	
VT:Montpelier	10/27/95	1.61	0.12	ND		ND		ND	
WA:Seattle	10/02/95	1.69	0.08	ND		ND		ND	
WA:Spokane	10/04/95	1.66	0.08	ND		ND		ND	
WV:Charleston	10/02/95	1.55	0.08	ND		ND		ND	

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

Table 17

Radionuclides in Pasteurized Milk

November 1995

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
AL:Montgomery	11/09/95	1.66	0.09	ND		ND		ND	
AR:Little Rock	11/07/95	1.54	0.08	ND		ND		ND	
AZ:Phoenix	11/21/95	1.59	0.10	ND		ND		ND	
CA:Los Angeles	11/08/95	1.62	0.08	ND		ND		ND	
CA:Sacramento	11/13/95	1.74	0.09	ND		ND		ND	
CO:Denver	11/15/95	1.63	0.08	ND		ND		ND	
CT:Hartford	11/06/95	1.69	0.09	ND		ND		ND	
DE:Wilmington	11/09/95	1.69	0.08	ND		ND		ND	
FL:Tampa	11/06/95	1.45	0.07	ND		ND		ND	
GA:Atlanta	11/15/95	1.68	0.09	ND		ND		ND	
HI:Honolulu	11/27/95	1.64	0.06	ND		ND		ND	
IA:Des Moines	11/13/95	1.84	0.10	ND		ND		ND	
IL:Chicago	11/08/95	1.50	0.14	ND		ND		ND	
KY:Louisville	11/06/95	1.64	0.14	ND		ND		ND	
MA:Boston	11/06/95	1.48	0.07	ND		ND		ND	
MD:Baltimore	11/03/95	1.68	0.08	ND		ND		ND	
MI:Detroit	11/15/95	1.68	0.08	ND		ND		ND	
MI:Grand Rapids	11/06/95	1.62	0.09	ND		ND		ND	
MN:St. Paul	11/16/95	1.77	0.09	ND		ND		ND	
MO:Kansas City	11/16/95	1.61	0.11	ND		ND		ND	
MS:Jackson	11/06/95	1.57	0.08	ND		ND		ND	
NC:Charlotte	11/07/95	1.59	0.08	ND		ND		ND	
NJ:Trenton	11/09/95	1.66	0.09	ND		ND		ND	
NM:Albuquerque	11/06/95	1.63	0.07	ND		ND		ND	
NV:Las Vegas	11/14/95	1.52	0.08	ND		ND		ND	
NY:Buffalo	11/06/95	1.52	0.14	ND		ND		ND	
NY:Syracuse	11/06/95	1.68	0.08	ND		ND		ND	
OH:Cincinnati	11/21/95	1.61	0.09	ND		ND		ND	
OH:Cleveland	11/03/95	1.69	0.09	ND		ND		ND	
OR:Portland	11/06/95	1.61	0.06	ND		ND		ND	
PA:Philadelphia	11/01/95	1.55	0.11	ND		ND		ND	
PA:Pittsburgh	11/06/95	1.60	0.09	ND		ND		ND	
PC:Cristobal	11/30/95	1.57	0.12	2	3	ND		ND	
PR:San Juan	11/10/95	1.60	0.12	ND		ND		ND	
SC:Charleston	11/20/95	1.68	0.09	ND		ND		ND	
TN:Chattanooga	11/06/95	1.59	0.11	ND		ND		ND	
TN:Knoxville	11/02/95	1.63	0.09	ND		ND		ND	

Table 17 (continued)

Radionuclides in Pasteurized Milk

November 1995

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
TN:Memphis	11/09/95	1.49	0.11	ND		ND		ND	
TX:Austin	11/07/95	1.67	0.09	ND		ND		ND	
TX:Ft. Worth	11/07/95	1.47	0.07	ND		ND		ND	
VA:Norfolk	11/29/95	1.56	0.09	ND		ND		ND	
VT:Burlington	11/29/95	1.77	0.10	ND		ND		ND	
WA:Seattle	11/07/95	1.51	0.14	ND		ND		ND	
WA:Spokane	11/09/95	1.50	0.11	ND		ND		ND	
WV:Charleston	11/06/95	1.59	0.09	ND		ND		ND	

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

Table 18

Radionuclides in Pasteurized Milk

December 1995

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	$\pm 2\sigma$
AL:Montgomery	12/07/95	1.59	0.08	ND		ND		ND	
AR:Little Rock	12/12/95	1.51	0.07	ND		ND		ND	
CA:Los Angeles	12/06/95	1.66	0.08	ND		ND		ND	
CA:Sacramento	12/11/95	1.52	0.09	ND		ND		ND	
CA:San Francisco	12/06/95	1.62	0.08	ND		ND		ND	
CO:Denver	12/13/95	1.49	0.07	ND		ND		ND	
CT:Hartford	12/07/95	1.70	0.08	ND		ND		ND	
DE:Wilmington	12/06/95	1.75	0.09	ND		ND		ND	
FL:Tampa	12/04/95	1.60	0.10	4	2	ND		ND	
GA:Atlanta	12/12/95	1.54	0.11	ND		ND		ND	
HI:Honolulu	12/26/95	1.63	0.12	ND		ND		ND	
IA:Des Moines	12/04/95	1.50	0.07	ND		ND		ND	
IL:Chicago	12/06/95	1.60	0.12	ND		ND		ND	
IN:Indianapolis	12/05/95	1.61	0.08	ND		ND		ND	
KS:Wichita	12/13/95	1.70	0.08	ND		ND		ND	
KY:Louisville	12/06/95	1.54	0.10	ND		ND		ND	
MA:Boston	12/04/95	1.70	0.09	ND		ND		ND	
MD:Baltimore	12/08/95	1.70	0.08	ND		ND		ND	
ME:Portland	12/07/95	1.66	0.10	ND		ND		ND	
MI:Detroit	12/07/95	1.70	0.15	ND		ND		ND	
MI:Grand Rapids	12/04/95	1.62	0.08	ND		ND		ND	
MN:St. Paul	12/06/95	1.57	0.08	ND		ND		ND	
MO:Kansas City	12/27/95	1.68	0.09	ND		ND		ND	
MS:Jackson	12/07/95	1.64	0.08	ND		ND		ND	
NC:Charlotte	12/05/95	1.57	0.09	ND		ND		ND	
ND:Minot	12/12/95	1.73	0.07	ND		ND		ND	
NJ:Trenton	12/07/95	1.51	0.10	ND		ND		ND	
NV:Las Vegas	12/04/95	1.63	0.08	ND		ND		ND	
NY:Buffalo	12/05/95	1.59	0.12	ND		ND		ND	
NY:Syracuse	12/04/95	1.67	0.08	ND		ND		ND	
OH:Cincinnati	12/19/95	1.63	0.09	ND		ND		ND	
OR:Portland	12/04/95	1.76	0.09	ND		ND		ND	
PA:Philadelphia	12/04/95	1.81	0.09	ND		ND		ND	
PA:Pittsburgh	12/05/95	1.56	0.08	ND		ND		ND	
PC:Cristobal	12/27/95	1.55	0.10	5	4	ND		ND	
PR:San Juan	12/07/95	1.66	0.09	ND		ND		ND	
SC:Charleston	12/05/95	1.80	0.10	ND		ND		ND	

Table 18 (continued)

Radionuclides in Pasteurized Milk

December 1995

Location	Date Collected	K g/L	K $\pm 2\sigma$	^{137}Cs pCi/L	^{137}Cs $\pm 2\sigma$	^{140}Ba pCi/L	^{140}Ba $\pm 2\sigma$	^{131}I pCi/L	^{131}I $\pm 2\sigma$
TN:Chattanooga	12/04/95	1.75	0.10	ND		ND		ND	
TN:Knoxville	12/11/95	1.48	0.08	ND		ND		ND	
TN:Memphis	12/13/95	1.48	0.14	ND		ND		ND	
TX:Austin	12/05/95	1.61	0.06	ND		ND		ND	
TX:Ft. Worth	12/19/95	1.69	0.08	ND		ND		ND	
VA:Norfolk	12/21/95	1.60	0.10	ND		ND		ND	
VT:Burlington	12/29/95	1.52	0.07	ND		ND		ND	
WA:Seattle	12/04/95	1.64	0.10	ND		ND		ND	
WV:Charleston	12/04/95	1.77	0.09	ND		ND		ND	

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

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Charles M. Petko
Office of the Director
National Air and Radiation Environmental Laboratory
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Rhonda Sears
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: sears.rhonda@epa.gov

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John G. Griggs
National Air and Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: griggs.john@epa.gov

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501 Third Street, N.W.
Washington, DC 20001
e-mail: conklin.craig@epa.gov

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