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Eastern Environmental
Radiation Facility
1890 Federal Drive
Montgomery, AL 36109

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Radiation

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Environmental Radiation Ambient Monitoring System (ERAMS) Manual

VOLUME I

Program Overview

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Environmental

Radiation

Ambient

Monitoring

System

E R A M S MANUAL

VOLUME I

PROGRAM OVERVIEW

May 1988

U.S. Environmental Protection Agency
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FOREWORD

This overview explains the operation of the Environmental Radiation Ambient Monitoring System (ERAMS). It is bound in loose-leaf format so that it may be updated as necessary.

Readers are encouraged to review the information and advise ERAMS headquarters of inaccuracies and suggested changes. Please send your comments or suggestions to the following address:

Chief, Monitoring and Analytical Services Branch
Eastern Environmental Radiation Facility
1890 Federal Drive
Montgomery, Alabama 36109

Charles R. Porter

Charles R. Porter, Director
Eastern Environmental Radiation Facility

1 THE ENVIRONMENTAL RADIATION AMBIENT MONITORING SYSTEM (ERAMS)

1.1 Objectives

The general objectives of the Environmental Radiation Ambient Monitoring System (ERAMS) are to provide a means of estimating ambient levels of radioactive pollutants in our environment, to follow trends in environmental radioactivity levels, and to assess the impact of fallout and other intrusions of radioactive materials. The ERAMS helps the Office of Radiation Programs assess and control the radiation dose to man, and, therefore, contributes to the wider mission of the EPA of ensuring the public health and environmental quality. This program also helps to fulfill a Presidential directive that, through Reorganizational Plan No. 3, gave EPA the primary responsibility within the Executive Branch for collating, analyzing, and interpreting data on environmental radiation levels.

Specifically, the ERAMS was designed to--

1. provide a direct assessment of the population's intake of radioactive pollutants due to fallout;
2. provide data for developing a set of dose computational models for specific sources and a national dose computational model to aggregate all sources and determine total population dose;
3. monitor pathways for significant population exposure from routine and accidental releases of radioactivity from major sources;

4. provide data for indicating additional sampling needs or other actions required to ensure public health and environmental quality in the event of a major release of radioactivity to the environment; and,
5. serve as a reference for data comparison with other localized and limited monitoring programs, e.g., state and utility.

1.2 Historical Background

On July 1, 1973, the U.S. Environmental Protection Agency, through its Office of Radiation Programs (ORP), combined several separate, but related radiation monitoring networks (some of which had been in existence since 1956) and implemented a new monitoring system known as the Environmental Radiation Ambient Monitoring System (ERAMS).

The previously operated networks had largely been fallout oriented. The moratorium on aboveground nuclear testing by the United States and Russia and an increase in the number of nuclear facilities made it obvious that a major realignment of these networks was necessary. Various components of previous monitoring networks, which included the Radiation Alert Network (RAN), Tritium Surveillance System (TSS), Interstate Carrier Drinking Water (ICDW), and the Pasteurized Milk Network (PMN) were restructured into the single, cohesive ERAMS.

Basically, ERAMS focuses upon nuclear sources and population centers, in contrast to the strict concern with population fallout detection of its predecessor networks. Such a focus enables EPA to assess more effectively the environmental impact of the nuclear fuel cycle and to provide radiation accident assessment capability, while still monitoring fallout and providing necessary data for population dose modeling.

The responsibility for operating ERAMS was assigned to the Director, Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama. However, the Chief of the Monitoring and Analytical Services Branch at EERF has operational responsibility for ERAMS.

1.3 Routine Operations

The ERAMS routinely monitors environmental levels of radioactivity in air by sampling and analyzing air particulates on a twice weekly schedule, in precipitation as measurable amounts occur, in drinking water and surface water grab samples on a quarterly basis, and in pasteurized milk samples on a monthly basis. The collection and analysis of these environmental samples constitutes the nation's single, major continuous source of environmental radiation data acquisition and analysis. It is a cooperative program between the Food and Drug Administration (FDA), which coordinates sample collection by state and local governments, and the Environmental Protection Agency (EPA), which performs the analyses using verified analytical and quality assurance procedures.

1.4 ALERT (Nonroutine) Operations

When elevated levels of radioactivity are anticipated or known to exist, ERAMS station operators may be requested to increase their collection frequencies. Such requests are made by appropriate EERF personnel or the EPA Regional Radiation Representative. The duration and frequency of sample collections are specified at the time of the request.

2 ORGANIZATIONAL RELATIONSHIPS

2.1 Administrative Organization

The administrative organization of the Environmental Radiation Ambient Monitoring System components and specific responsibilities of the various offices and individuals concerned are set forth in the following sections of this manual. Operations of the ERAMS components will be as stated in this manual unless specifically modified by the Chief, Monitoring and Analytical Services Branch (MASB), EERF. Any major operational changes will be documented and new sections to this manual will be supplied to reflect the changes.

2.2 Component Organization

EPA's Office of Radiation Programs made an extensive evaluation of existing radiation monitoring programs and structured the ERAMS so that it would provide a continuous environmental radiation 'picture' of the United States. The ERAMS' component stations are distributed throughout the United States and cover each geographical region, most individual states, and all major population centers. The geographical distribution addresses population and source distribution as well as the necessity of coordinating sample collections with state agencies. Some sampling stations located near major potential release points have been effective in measuring both the wide-scale impact from global events and the potential health risk from accidental releases.

The ERAMS is a dynamically functioning system that can easily be improved and expanded to meet changing requirements. For example, sample acquisition and validity can be improved by replacing grab sampling with sequential or composite sampling; the number of sampling stations can be increased to cover possible new sources; and the scope of the ERAMS can be expanded by analyzing samples for other pollutants.

2.3 Requests to Establish ERAMS Stations

If a state identifies a need for an additional station, the request should be made by the State official principally concerned with radiation safety or environmental surveillance. The request should be addressed to the Director, Eastern Environmental Radiation Facility, Office of Radiation Programs, through the EPA Regional Radiation Representative. Each request received at the EERF is considered by the ERAMS steering committee, and a decision is made based on the justification of need and availability of equipment. The request should be made at least 90 days prior to the planned date for start of operation and should include the following information:

- -- proposed station location
- -- sample media to be collected
- -- other types of monitoring to be conducted concurrently with ERAMS operations
- -- reason for establishing the station (scientific justification if similar stations exist in the state)
- -- name, title, address, and telephone number of the responsible official
- -- name, address, and telephone number of the station operator

2.4 Requests to Terminate ERAMS Stations

Requests by a state to terminate operation of a station should be directed as above in Section 2.3. Requests should include the following information:

-- station number and location

-- full inventory of all ERAMS equipment and materials on hand, indicating whether or not each item is operable

-- name and address of person to contact regarding equipment and supplies on hand

-- reason for termination of the station

2.5 Requests to Relocate ERAMS Stations

Stations may be relocated within a state by agreement of the Director, EERF, and the responsible State official. Requests to relocate should be directed to the EERF through the EPA Regional Radiation Representative and should include the following information:

-- station number

-- present location (address)

-- present operator

-- present responsible State official

-- proposed location (address)

-- proposed operator

-- proposed responsible State official

-- reason for relocation

-- expenses involved in relocation and portion thereof that the EPA will be expected to assume

2.6 Change of ERAMS Operator

Both station operators and alternate operators may change due to modifications in state and local organizational structure and personnel. Notification of changes in personnel should be directed to the Chief, Monitoring and Analytical Services Branch (MASB), Eastern Environmental Radiation Facility (EERF), with an information copy to the EPA Regional Representative. The notification should include the following information:

-- station number

-- location

-- former operator

-- new operator

-- new business address

-- new business phone

-- new home phone

3 ADMINISTRATION

3.1 General Policy

It is the policy of the Eastern Environmental Radiation Facility (EERF) to either supply or reimburse station operators for equipment and supplies necessary to install and operate field stations.

3.2 Equipment and Supplies

Station operators may request equipment and supplies by mailing a completed request form to the EERF or by telephoning the EERF if supplies or equipment are urgently needed to continue operating a station. Appropriate equipment and supply request forms are illustrated in Sections 1, 5, and 7 of Volume 2 of this manual.

3.3 Reimbursement for Installation, Local Maintenance, and Repairs

The cost to establish a new ERAMS station will be reimbursed to the State or paid for by government purchase order only after receipt of a request at the EERF. Expenditures for maintaining or acquiring designated equipment or for modifying a station, e.g., modifying or improving on electrical installation, must be approved in advance by the Chief, Monitoring and Analytical Services Branch, and the State will be reimbursed after documentation of expenditure is received and approved at the EERF.

3.4 Other Uses of ERAMS Equipment

Health agencies may use ERAMS equipment to obtain special samples or perform special monitoring services. The Chief, MASB, should be informed of the alternate use to assure such use will not interfere with ERAMS objectives.

3.5 Communications

All communications and requests for reimbursement for authorized services and expenditures should be directed to--

Chief, Monitoring and Analytical Services Branch
Eastern Environmental Radiation Facility
1890 Federal Drive
Montgomery, AL 36109

Telephone Numbers:
Commercial (205) 272-3402
Federal Telephone System 534-7615

4 ERAMS SAMPLING STATION LOCATIONS

4.1 Air Particulates

Air particulate samples are collected at 69 field sampling stations. These locations were selected for wide population coverage and proximity to possible sources of environmental radioactivity. Table 4.1 and Figure 4.1 show the locations of the air particulate sampling stations, and the types of analyses are given in Table 5.1. Many of these stations were chosen to monitor the environs of potential airborne release sources.

TABLE 4.1

ERAMS Air Particulates and Precipitation Sampling Stations

AK: Anchorage	GA: Atlanta	MN: Minneapolis
AK: Juneau	HI: Honolulu	MO: Jefferson City
AL: Ashford	IA: Iowa City	MS: Jackson
AL: Montgomery	ID: Boise	MT: Helena
AR: Little Rock	ID: Idaho Falls	NC: Charlotte
AZ: Phoenix	IL: Chicago	NC: Wilmington
CA: Berkeley	IN: Indianapolis	ND: Bismarck
CA: Los Angeles	KS: Topeka	NE: Lincoln
CO: Denver	KY: Frankfort	NH: Concord
CT: Hartford	LA: New Orleans	NJ: Trenton
DE: Wilmington	MA: Lawrence	NM: Santa Fe
FL: Jacksonville	ME: Augusta	NV: Las Vegas
FL: Miami	MI: Lansing	NY: Albany

TABLE 4.1 - Continued

ERAMS Air Particulates and Precipitation Sampling Stations

NY: New York	PA: Harrisburg	TX: El Paso
NY: Niagara Falls	PA: Three Mile Island	UT: Salt Lake City
NY: Syracuse	PA: Pittsburgh	VA: Lynchburg
NY: Yaphank	RI: Providence	VA: Virginia Beach
OH: Columbus	SC: Barnwell	VT: Montpelier
OH: Painesville	SC: Columbia	WA: Olympia
OH: Toledo	SD: Pierre	WA: Spokane
OK: Oklahoma City	TN: Knoxville	WV: Charleston
OR: Portland	TN: Nashville	WI: Madison
PA: Goldsboro	TX: Austin	WY: Cheyenne

4.2 Krypton-85

Dry compressed air samples are purchased from commercial air suppliers located in 12 cities across the United States. Table 4.2 and Figure 4.2 show the locations of the Krypton-85 sampling stations.

TABLE 4.2

Krypton-85 Sampling Stations

AL: Montgomery	MA: Boston	NY: Buffalo
CA: Oakland	MI: Detroit	NY: Utica
FL: Tampa	NC: Greensboro	OK: Oklahoma City
IL: Chicago	NJ: Camden	OR: Portland

Figure 4.1 Air Particulate and Precipitation Sampling Stations

Figure 4.2 Krypton-85 Sampling Stations

4.3 Precipitation

Precipitation samples are collected at 69 stations. These locations are the same as those selected for air particulate sampling. Table 4.1 and Figure 4.1 show the locations of the precipitation sampling stations.

4.4 Drinking Water

There are 77 sampling stations that collect drinking water samples. These locations are either in major population centers or near selected nuclear installations. Table 4.3 and Figure 4.3 show the locations of the drinking water sampling stations.

TABLE 4.3

Drinking Water Sampling Stations

AK:	Fairbanks	FL:	Miami	MD:	Baltimore
AL:	Dothan	FL:	Tampa	MD:	Conowingo
AL:	Montgomery	GA:	Savannah	ME:	Augusta
AL:	Muscle Shoals	HI:	Honolulu	MI:	Detroit
AL:	Scottsboro	IA:	Cedar Rapids	MI:	Grand Rapids
AR:	Little Rock	ID:	Boise	MN:	Minneapolis
CA:	Berkeley	ID:	Idaho Falls	MN:	Red Wing
CA:	Los Angeles	IL:	West Chicago	MS:	Jackson
CO:	Denver	IL:	Morris	MS:	Port Gibson
CO:	Platteville	KS:	Topeka	MT:	Helena
CT:	Hartford	LA:	New Orleans	NC:	Charlotte
DC:	Washington	MA:	Lawrence	NC:	Wilmington
DE:	Dover	MA:	Rowe	ND:	Bismarck

TABLE 4.3 - Continued

Drinking Water Sampling Stations

NE:	Lincoln	OH:	Painesville	SC:	Seneca
NH:	Concord	OH:	Toledo	TN:	Chattanooga
NJ:	Trenton	OK:	Oklahoma City	TN:	Knoxville
NJ:	Waretown	OR:	Portland	TX:	Austin
NM:	Santa Fe	PA:	Columbia	VA:	Doswell
NV:	Las Vegas	PA:	Harrisburg	VA:	Lynchburg
NY:	Albany	PA:	Pittsburgh	VA:	Virginia Beach
NY:	New York City	PC:	Ancon	VI:	St. Thomas
NY:	Niagara Falls	RI:	Providence	WA:	Richland
NY:	Syracuse	SC:	Barnwell	WA:	Seattle
OH:	Cincinnati	SC:	Columbia	WI:	Genoa
OH:	Columbus	SC:	Hartsville	WI:	Madison
OH:	East Liverpool	SC:	Jenkinsville		

4.5 Surface Water

Surface water samples are collected at 58 sampling locations. These grab samples are collected from surface water sources, most of which are downstream from nuclear facilities or from background locations. Table 4.4 and Figure 4.4 show the locations of the surface water sampling locations.

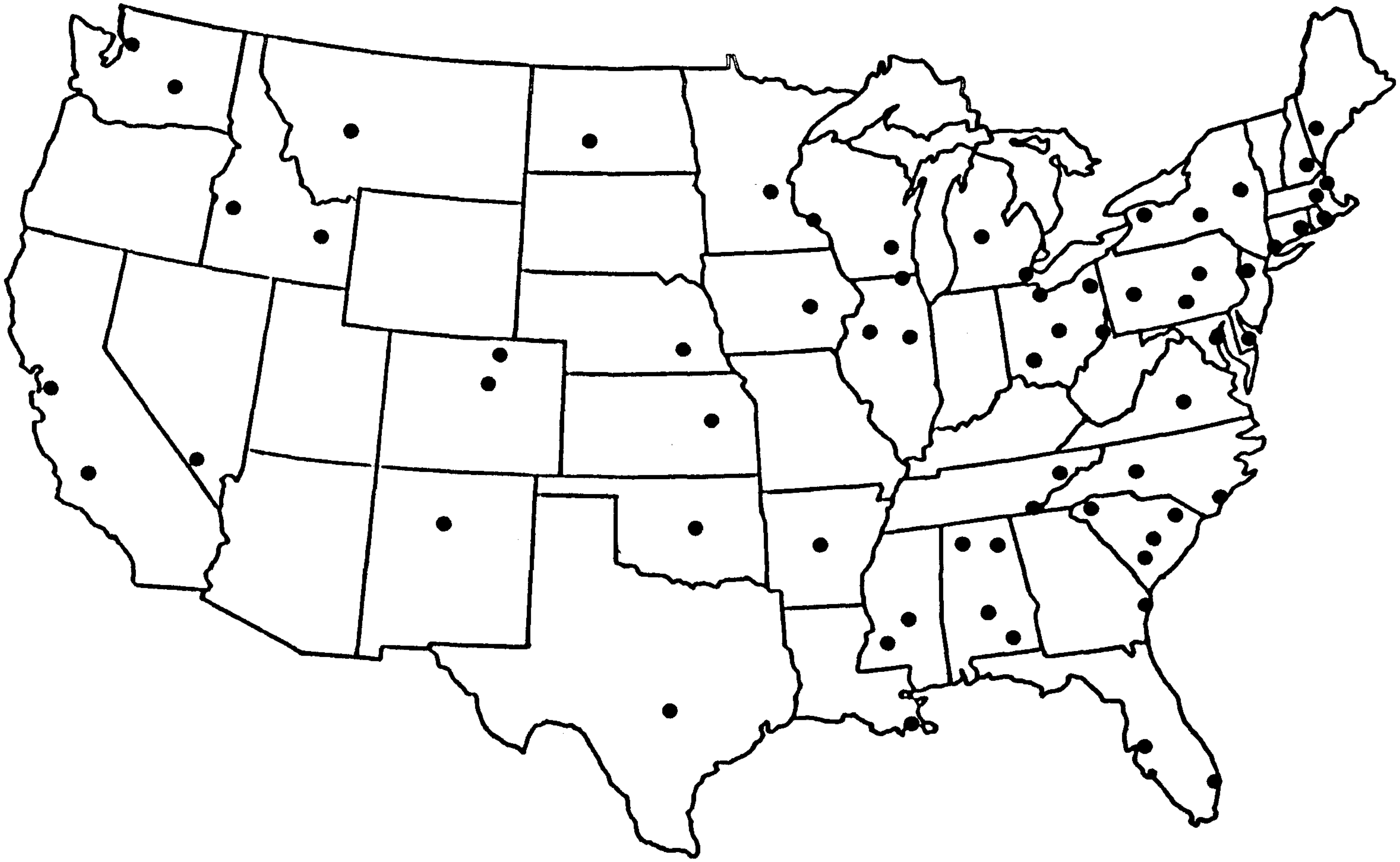

Figure 4.3 Drinking Water Sampling Stations

TABLE 4.4

Surface Water Sampling Locations

Location	Source
AL: Decatur	Tennessee River
AL: Gordon	Chattahoochee River
AL: Scottsboro	Tennessee River
AR: Little Rock	Arkansas River
CA: Clay Station	Folsom S. Canal
CA: Diablo Canyon	Pacific Ocean
CA: Eureka	Humboldt Bay
CA: San Onofre	Pacific Ocean
CO: Platteville	South Platte River
CT: East Haddam	Connecticut River
CT: Waterford	Long Island Sound
FL: Crystal River	Gulf of Mexico
FL: Ft. Pierce	Atlantic Ocean
FL: Homestead	Biscayne Bay
IA: Cedar Rapids	Cedar River
ID: Buhl	Snake River
IL: E. Moline	Mississippi River
IL: Morris	Illinois River
IL: Zion	Lake Michigan
KS: Le Roy	Neosho River
LA: New Orleans	Mississippi River

TABLE 4.4 - Continued

Surface Water Sampling Locations

Location	Source
MA: Plymouth	Cape Cod Bay
MA: Rowe	Deerfield River
MD: Conowingo	Susquehanna River
MD: Lusby	Chesapeake Bay
ME: Wiscasset	Montseway Bay
MI: Bridgman	Lake Michigan
MI: Charlevoix	Lake Michigan
MI: Monroe	Lake Erie
MI: South Haven	Lake Michigan
MN: Monticello	Mississippi River
MN: Red Wing	Mississippi River
MS: Port Gibson	Mississippi River
NC: Charlotte	Catawba River
NC: Southport	Atlantic Ocean
NE: Rulo	Missouri River
NJ: Bayside	Delaware River
NJ: Toms River	Oyster Creek
NV: Boulder City	Colorado River
NY: Chelsea	Hudson River
NY: Ossining	Lake Ontario
NY: Oswego	Hudson River
OH: Toledo	Lake Erie

TABLE 4.4 - Continued

Surface Water Sampling Locations

Location	Source
PA: Danville	Susquehanna River
SC: Allendale	Savannah River
SC: Columbia	Broad River
SC: Hartsville	Lake Robinson
TN: Daisy	Tennessee River
TN: Kingston	Clinch River
TX: El Paso	Rio Grande
TX: Matagorda	Colorado River
VA: Doswell	North Anna River
VA: Newport News	James River
WA: Northport	Columbia River
WA: Richland	Columbia River
WI: Victory	Mississippi River
WI: Two Creeks	Lake Michigan
WV: Wheeling	Ohio River

4.6 Pasteurized Milk

Pasteurized milk samples are collected and composited at 66 sampling sites. These locations were selected to cover each state and represent more than 80% of the milk consumed in major U.S. population centers. Table 4.5 and Figure 4.5 show the locations of the principal pasteurized milk sampling stations.

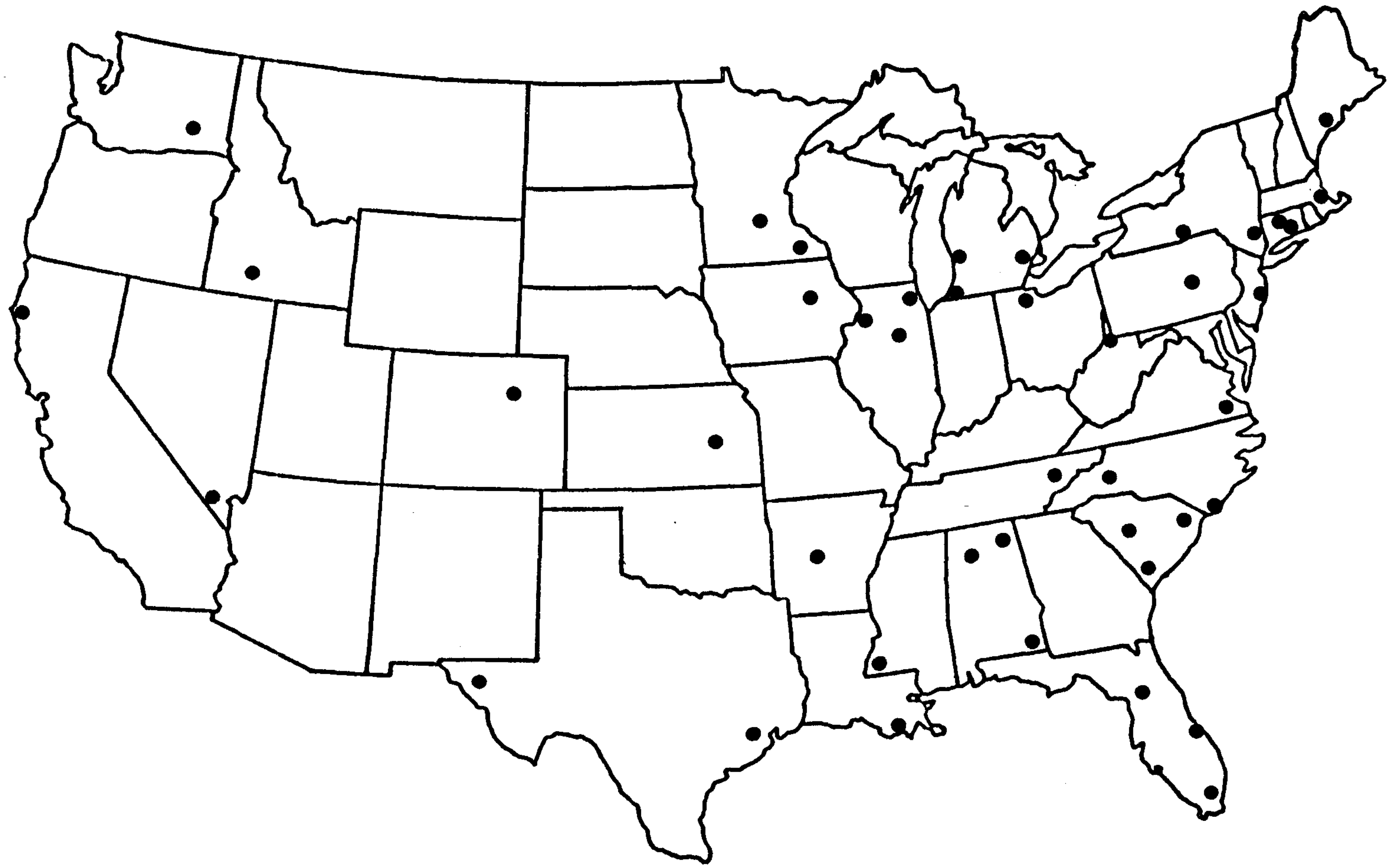

Figure 4.4 Surface Water Sampling Stations

TABLE 4.5

Pasteurized Milk Sampling Stations

AK:	Anchorage	MD:	Baltimore	OK:	Oklahoma City
AL:	Montgomery	ME:	Portland	OR:	Portland
AR:	Little Rock	MI:	Detroit	PA:	Philadelphia
AZ:	Phoenix	MI:	Grand Rapids	PA:	Pittsburgh
CA:	Los Angeles	MN:	Minneapolis	PC:	Cristobal
CA:	Sacramento	MN:	St. Paul	PR:	San Juan
CA:	San Francisco	MO:	Kansas City	RI:	Providence
CO:	Denver	MO:	St. Louis	SC:	Charleston
CT:	Hartford	MS:	Jackson	SD:	Rapid City
DC:	Washington	MT:	Helena	TN:	Chattanooga
DE:	Wilmington	NC:	Charlotte	TN:	Knoxville
FL:	Tampa	ND:	Minot	TN:	Memphis
GA:	Atlanta	NE:	Omaha	TX:	Austin
HI:	Honolulu	NH:	Manchester	TX:	Fort Worth
IA:	Des Moines	NJ:	Trenton	UT:	Salt Lake City
ID:	Idaho Falls	NM:	Albuquerque	VA:	Norfolk
IL:	Chicago	NV:	Las Vegas	VT:	Burlington
IN:	Indianapolis	NY:	Buffalo	WA:	Seattle
KS:	Wichita	NY:	New York	WA:	Spokane
KY:	Louisville	NY:	Syracuse	WI:	Milwaukee
LA:	New Orleans	OH:	Cincinnati	WV:	Charleston
MA:	Boston	OH:	Cleveland	WY:	Laramie

Figure 4.5 Pasteurized Milk Sampling Stations

5 SAMPLING AND REPORTING

5.1 Sample Type and Frequency

The types of samples collected and sampling frequencies are summarized in Table 5.1 for each ERAMS component.

5.2 Radiochemical Analyses and Frequency

The radiochemical analyses performed and the analysis frequency are summarized in Table 5.2 for each ERAMS component.

5.3 Data Handling

ERAMS data are computed and compiled by the Monitoring and Analytical Services Branch of the EERF. Raw data are then entered into computer storage and verified. The Computer Services Section of the Technical Support Branch (TSB) is responsible for subsequent formatting for publication. The primary consideration is to present the data so that they give as complete a picture as possible while allowing the greatest freedom to analyze the data without introducing bias. We consider data values to represent samples from an unknown population distribution that we are seeking to characterize. In this perspective, each data file is a time series involving the random variable of nuclide concentration. Standard statistical tools, therefore, may be readily applied.

5.3.1 Reported values. All specific and gross radionuclide analyses are reported as the counting results indicate, whether the number is negative, zero, or positive. "Minimum detectable level" (MDL) for a given analysis is defined as that value which is equal to or greater than the

TABLE 5.1
Sample Type and Frequency

ERAMS COMPONENT	TYPE OF SAMPLE	SAMPLING FREQUENCY
Airborne Particulates	Filters-4 inch (10 cm diameter) from Centrifugal pump air samplers	Filters are changed twice weekly and sent to the EERF
Krypton-85 in air	Dry compressed air samples purchased from commercial air suppliers	Every two years
Precipitation	Precipitation	Collected as precipitation occurs Composited at the EERF into single monthly samples
Drinking Water	Grab samples from major population centers	Quarterly
Surface Water	Grab samples downstream from nuclear facilities or from background sites	Quarterly
Pasteurized Milk	Composite samples from major population centers	Monthly

TABLE 5.2
Sample Analyses and Frequency

ERAMS COMPONENT	ANALYSIS	ANALYSIS FREQUENCY
Airborne Particulates	1. G.M. Field Estimates	1. Each of twice weekly samples
	2. Gross Beta	2. Each of twice weekly samples
	3. Gamma Scans	3. All samples showing 1 pCi/m^3 gross beta
	4. ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{234}U, ^{235}U, ^{238}U	4. Semiannually on composite air particulate filters
Krypton-85	^{85}K	Every two years
Precipitation	1. Tritium	1. Monthly on composite samples
	2. Gross Beta	2. Monthly on composite samples
	3. Gamma Scans	3. Monthly on composite samples
	4. ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{234}U, ^{235}U, ^{238}U	4. Annually on spring quarter composites
Drinking Water	1. Tritium	1. Quarterly
	2. Gamma Scans	2. Annually on composite samples
	3. Gross Alpha	3. Annually on composite samples
	4. Gross Beta	4. Annually on composite samples
	5. ^{226}Ra	5. Annually on samples with gross alpha >2 pCi/l
	6. ^{228}Ra	6. On samples with ^{226}Ra between 3-5 pCi/l
	7. ^{90}Sr	7. Annually on composite samples
	8. ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{234}U, ^{235}U, ^{238}U	8. Annually on samples with gross alpha >2 pCi/l
	9. ^{131}I	9. Annually on one individual sample per sampling site
Surface Water	1. Tritium	1. Quarterly
	2. Gamma Scans	2. Annually on April samples
Pasteurized Milk	1. ^{131}I, ^{140}Ba, ^{137}Cs, ^{40}K	1. Monthly
	2. ^{89}Sr, ^{90}Sr	2. Annually on July samples
	3. ^{89}Sr, ^{90}Sr	3. January, April & October intraregional composites from each of EPA's 10 regions

best estimate of the two sigma total analytical error. MDL's are not reported with specific analyses. A tabulation of MDL's for each specific radionuclide in a particular media is given in Table 5.3.

5.3.2 Reporting error terms. Each reported value for a specific analysis is accompanied by a counting error term at the two sigma (95%) confidence interval.

5.3.3 Significant figures. All reported values are rounded to no more than three significant figures. If the last figure to be rounded is five or greater, the preceding digit is increased by one, otherwise the preceding digit is not changed.

5.3.4 Reporting levels. The reporting units and the smallest increments for reporting measurements of each isotope are shown in Table 5.3.

TABLE 5.3

ERAMS Reporting Increments and Minimum Detectable Levels

for Radionuclide Analyses

Radionuclides	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Gross Alpha	Water	pCi/l	1 pCi/l	2 pCi/l
Gross Beta	Air	pCi/m^3	0.01 pCi/m^3	0.01 pCi/m^3
	Water	pCi/l	1 pCi/l	1 pCi/l
	Precipitation	nCi/m^2	0.01 nCi/m^2	0.01 nCi/m^2(*)
Tritium	Water	nCi/l	0.1 nCi/l	0.2 nCi/l
^{85}K	Ambient Air	pCi/m^3	0.1 pCi/m^3	2 pCi/m^3
$^{238-239-240}Pu$	Air	aCi/m^3	0.1 aCi/m^3	0.015 pCi(**) per sample
	Water	pCi/l	0.001 pCi/l	0.015 pCi per sample
$^{234-235-238}U$	Air	aCi/m^3	0.1 aCi/m^3	0.015 pCi(**) per sample
	Water	pCi/l	0.001 pCi/l	0.015 pCi per sample

TABLE 5.3 - Continued

ERAMS Reporting Increments and Minimum Detectable Levels

for Radionuclide Analyses

Radionuclides	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
^{226}Ra	Water	pCi/l	0.1 pCi/l	0.1 pCi/l
^{90}Sr	Milk	pCi/l	0.1 pCi/l	1 pCi/l
	Water	pCi/l	0.1 pCi/l	1 pCi/l
^{89}Sr	Milk	pCi/l	1 pCi/l	5 pCi/l(***)
^{131}I	Milk	pCi/l	1 pCi/l	10 pCi/l(***)
	Water	pCi/l	1 pCi/l	10 pCi/l(***)
	Water(specific)	pCi/l	0.1 pCi/l	0.4 pCi/l
^{137}Cs	Milk	pCi/l	1 pCi/l	10 pCi/l
	Water	pCi/l	1 pCi/l	10 pCi/l
^{140}Ba	Milk	pCi/l	1 pCi/l	10 pCi/l(***)
	Water	pCi/l	1 pCi/l	10 pCi/l(***)
Potassium	Milk	g/l	0.01 g/l	0.12 g/l
	Water	g/l	0.01 g/l	0.12 g/l
^{40}K	Water	pCi/l	1 pCi/l	100 pCi/l

(*) The value in terms of nCi/m^2 would be dependent on precipitation (mm).

(**) This value in terms of pCi/m^3 would be dependent on the air volume.

(***) Activity as of the day of counting.

6 PUBLICATIONS

Data and findings from the ERAMS are routinely published in two documents, Environmental Radiation Data (ERD) and Radiological Quality of the Environment. These publications are available from either the Office of Radiation Programs headquarters in Washington, D.C., or from the EERF in Montgomery, Alabama. The ERD is published quarterly by the Eastern Environmental Radiation Facility and contains results from the analyses of ERAMS samples collected from the previous quarter. Radiological Quality of the Environment is published by the Office of Radiation Programs in an effort to summarize the environmental consequences of all radiation sources.

On a non-routine basis, the EERF will publish ERAMS results generated from samples collected during a time period that represents a specific event. For example, samples collected following an aboveground nuclear test by the Chinese may be published in a special report to reflect the findings related to that test.

7 ERAMS ALERT STATUS

7.1 Introduction

In addition to providing data for long-term trends and ambient concentrations, the ERAMS is designed to provide data for short-term situations such as fallout or environmental releases from other nuclear events. Two components of ERAMS are particularly useful when fallout occurs from atmospheric testing. The air and precipitation component provides almost immediate information on the geographic distribution and concentrations of fallout in airborne particulates and precipitation, while the pasteurized milk component provides information on the uptake and transfer of fallout in milk.

7.2 Protocol

EPA's Office of Radiation Programs (ORP) is notified by the Department of Energy whenever the possibility of fallout from nuclear testing occurs. Information on the movement of atmospheric radioactive debris is provided by the National Oceanic and Atmospheric Administration. ORP-Washington notifies the EERF in Montgomery, Alabama, of the situation.

The EERF then puts the ERAMS air and precipitation component on alert status and contacts the EPA regional radiation representatives, who, in turn, notify the station operators to begin daily collection of air and precipitation samples. A follow-up contact is initiated by EERF personnel to determine adequacy of sampling and mailing materials. Five-hour estimates of gross beta radioactivity in the air particulate samples are made by the station operators before mailing the samples to the EERF. If the five-hour estimate is twice the normal reading, the station operators are instructed to notify the EERF by telephone immediately. Precipitation samples are shipped directly to the EERF, where they are analyzed for gamma activity.

In an alert situation, the EERF compiles the results and telephones them daily to ORP-Washington where they are included in the ORP press releases. The EERF also keeps the regional radiation representatives apprised of the situation.

Following the initial projection of the movement of radioactive debris, a decision is made as to when additional collections of pasteurized milk will be made. The Office of Radiation Programs in Washington notifies FDA of the decision to collect additional samples and the dates by which they are desired. Since the Food and Drug Administration provides the authority for collecting these samples, the FDA then contacts its regional milk and food consultants, who, in turn, contact the station operators. These samples are mailed to the EERF where they are analyzed for gamma radioactivity. The results are then telephoned to ORP-Washington where they are incorporated into press releases and provided to FDA. The EERF also notifies the regional representatives of any significant findings.

Raw data from these programs are included in the Environmental Radiation Data report issued quarterly from the EERF. Comprehensive reports may also be made to summarize results, estimate health effects, and address overall consequences.

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