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OHIO'S INDEPENDENT AND SPLIT SAMPLING PLAN FOR THE FERNALD ENVIRONMENTAL MONITORING PROGRAM 1996

01/30/96

OEPA DOE-FN
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LETTER

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OhioEPA

State of Ohio Environmental Protection Agency

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George V. Voinov
Governor

January 30, 1996

RE: OHIO'S INDEPENDENT AND SPLIT SAMPLING PLAN FOR THE FERNALD ENVIRONMENTAL MONITORING PROGRAM 1996

Mr. Jack Craig
Director
Fernald Area Office
P.O. Box 538705
Cincinnati, Ohio 45253-8705

Dear Mr. Craig:

Enclosed is a Draft copy of Ohio EPA's AIP Field Sampling Plan prepared by the Office of Federal Facilities Oversight. This plan is submitted in partial fulfillment of Ohio EPA's obligations under the Agreement in Principle as defined in Attachment A of the AIP. Please review the plan and submit any comments by March 1, 1996. Ohio EPA is currently carrying out this plan for calendar year 1996 sampling. Changes to the sampling program may be made based upon comments received.

If you have any questions, please contact me at 513-285-6453.

Sincerely,

Donna J. Bohannon

Donna J. Bohannon
Environmental Monitoring Coordinator
Office of Federal Facilities Oversight

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FIELD SAMPLING PLAN

OHIO INDEPENDENT AND SPLIT SAMPLING PLAN FOR THE FERNALD ENVIRONMENTAL MONITORING PROGRAM 1996

draft

PREPARED BY:
THE OHIO ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF FEDERAL FACILITIES OVERSIGHT
UNDER THE AGREEMENT IN PRINCIPLE
GRANT #DE-FG05-940R22206

ASSISTANCE PROVIDED BY:

OHIO ENVIRONMENTAL PROTECTION AGENCY:
DIVISION OF EMERGENCY AND REMEDIAL RESPONSE
DIVISION OF SURFACE WATER

OHIO DEPARTMENT OF HEALTH:
CONTAMINATED SITES GROUP

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ACRONYMS AND ABBREVIATIONS

AIP	Agreement In Principle
AMS	Air Monitoring Station
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
COC	Chain of Custody
DOD	Department of Defense
DOE	Department of Energy
EMP	Environmental Monitoring Program
FERMCO	Fernald Environmental Restoration Management Corporation
FSP	Field Sampling Plan
GMR	Great Miami River
GPS	Global Positioning System
GRS	Grass
IDL	Instrument Detection Limit
KPA	Kinetic Phosphorescence Analysis
MDA	Minimum Detection Activity
MDL	Minimum Detection Limit
NPDES	National Pollutant Discharge Elimination System
OEPA	Ohio Environmental Protection Agency
OFFO	Office of Federal Facilities Oversight
ODH	Ohio Department of Health
ODH/BRP	Ohio Department of Health/Bureau of Radiation Protection
OU	Operable Unit
QA/QC	Quality Assurance/Quality Control
RD/RA	Remedial Design/Remedial Action
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SER	Site Environmental Report
SOL	Soil
SOP	Standard Operating Procedure
TLD	Thermoluminescent Dosimeter
USEPA	United States Environmental Protection Agency

SECTION 1.0 INTRODUCTION

1.1 SITE BACKGROUND

Fernald is a Department of Energy (DOE) facility that produced uranium metals for military defense from 1953 through 1989. The 1050 acre site is located 17 miles northwest of Cincinnati, Ohio near the rural village of Fernald, in Hamilton County. The surrounding area is farm land and the nearest residents are situated less than one kilometer west of the site fenceline. The facility is located directly over the Great Miami Aquifer, which is designated a sole source aquifer by the Environmental Protection Agency (U.S. EPA) and is a valued natural resource (refer to Figure 1-1).

Uranium metal products including enriched or depleted uranium and small amounts of thorium metal were produced at Fernald for the nation's defense programs. Production stopped in 1989 to focus resources on environmental restoration. Production processes at the plant involved the use of acids, bases, organics, inorganics, and radioactive materials. Fernald currently manages radioactive and nonradioactive hazardous materials. In 1990, DOE management responsibility transferred from Defense Programs to the Office of Environmental Restoration and Waste Management. In 1991, DOE officially changed Fernald's mission from production to environmental cleanup.

The site is divided into five operable units. The operable unit (OU) concept was developed to deal with the complex issues and huge volume of work in the cleanup of the Fernald site. Each of the five operable units has its own work schedule and cleanup remedy. Operable unit 1 consists of six waste pits, a burn pit (used for burning waste and disposal), and a clearwell (a settling basin for surface water runoff). OU2 includes a solid waste landfill, two lime sludge ponds, an active and inactive flyash piles, and the Southfield disposal area. OU3 includes the former production area that is contaminated with uranium, thorium, and other radioactive materials, and hazardous chemicals. OU4 consists of silos one through four, including the K-65 silos that contain radium bearing waste, generated from processing pitchblende ore in the 1950's. OU5 includes other environmental media such as groundwater, surface water, soil, sediments, wildlife, and vegetation that are not included in operable units one through four. Significant progress has been made in each of the operable units in the past three years. Each OU has a Record of Decision (OU3 has an Interim Record of Decision) in place and is now in the Remedial Design/Remedial Action phase (also refer to Figure 1-2).

1.2 ENVIRONMENTAL MONITORING

Environmental monitoring is a part of the ongoing cleanup activities. Cleanup activities have been conducted since 1992 by the Fernald Environmental Restoration Management Company (FERMCO). Prior to this, the site was operated by Westinghouse and National Lead of Ohio. FERMCO follows DOE Orders 5400.5, "Radiation Protection of the Public and the Environment" and 5400.1, "General Environmental Protection Program" which address

environmental releases of radionuclides. Fernald's Environmental Monitoring Program (EMP) is required by DOE Order 5400.1. FERMCO monitors air, groundwater, surface water, sediment, soil and grass, fish, meat, and produce. Milk was monitored until 1995, when the local dairy farm switched operations from dairy to beef cattle. In compliance with DOE Order 5400.1, FERMCO summarizes the annual environmental monitoring results in their Site Environmental Report (SER).

The State of Ohio has conducted environmental monitoring at Fernald since 1985. An Agreement in Principle (AIP) between State of Ohio and DOE ensures that funding is provided for Ohio to administer enhanced technical support. Ohio EPA Office of Federal Facilities Oversight (OFFO) is responsible for coordinating Ohio's oversight and support activities. Objectives in the AIP ensure the adequacy of Fernald's Environmental Monitoring Program (EMP) and encourage public involvement and education. As part of Ohio's obligation under the AIP, Ohio has expanded on the State's previous sampling efforts and developed the following Field Sampling Plan for both independent and split sampling.

1.3 CONTAMINANTS OF CONCERN

The contamination at Fernald is mainly the result of the production of uranium metals. However, additional contamination may result from construction during remediation activities and waste handling. On and off-site contamination is monitored by the periodic sampling of media (i.e., groundwater, surface water, soil, sediment, air, and produce). Environmental monitoring is performed to evaluate potential risks that may be posed to the public and the surrounding environment. Monitoring also brings attention to increases in contamination that may occur so contamination can be kept to a minimum.

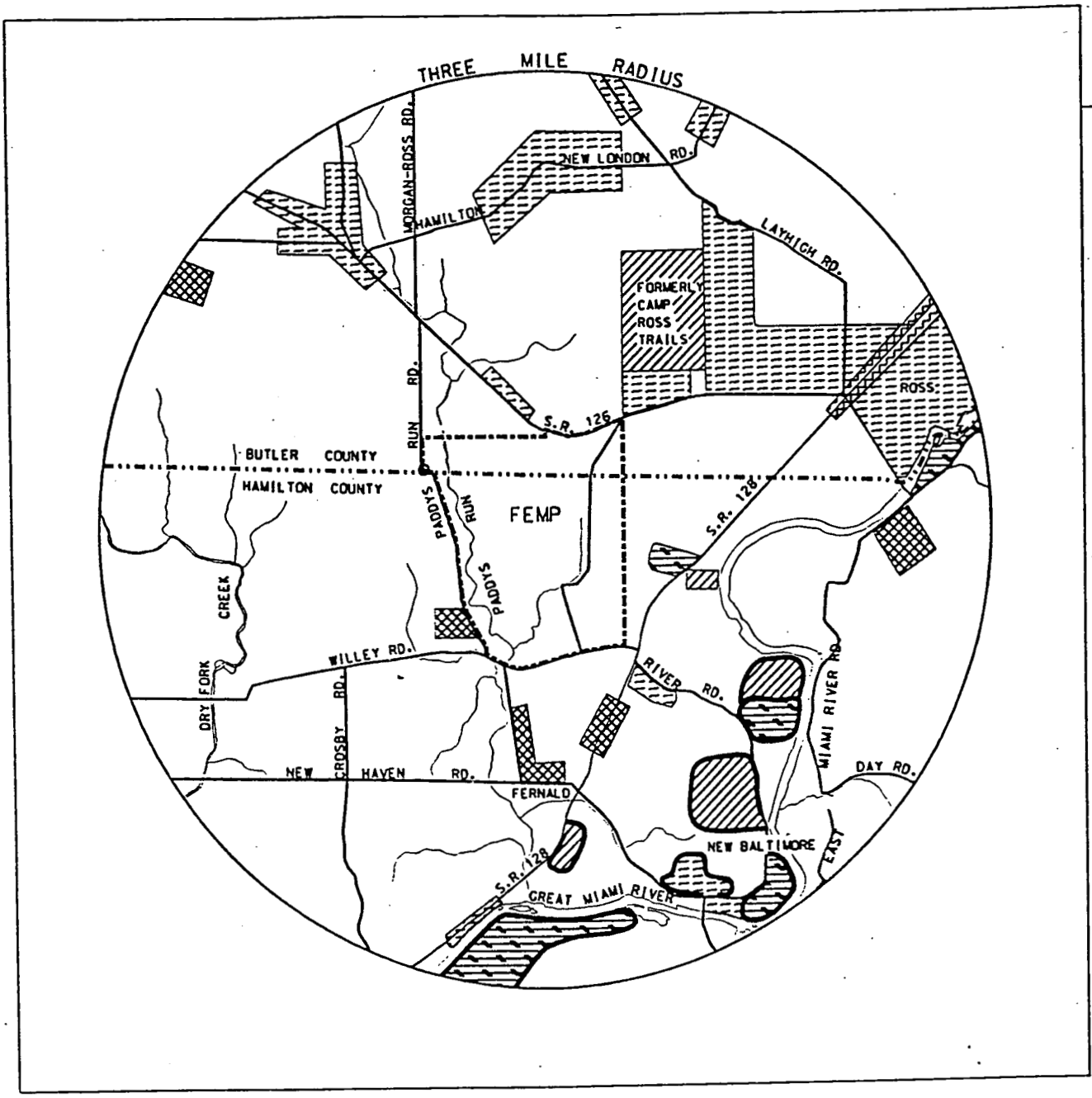
The following is a list of the radioactive contaminants of concern found at the Fernald site and the media that will be sampled as explained in this Field Sampling Plan.

MEDIA	CONTAMINANTS	
GROUNDWATER	Uranium	
SURFACE WATER	Uranium	Radium 226 & 228
SEDIMENT	Uranium Cesium 137	Radium 226 Thorium 228, 230, & 232
SOIL AND GRASS	Uranium	
PRODUCE AND SOIL	Uranium	
FISH	Uranium	
AIR	Uranium	Radon-222

000008

Figure 1-1 Landuse Adjacent to the FEMP

7469



LEGEND:

- COUNTY LINE
- FEMP PROPERTY BOUNDARY
- RESIDENTIAL
- INDUSTRIAL
- RECREATION
- MINING
- MIXED USE
- AGRICULTURE/OPEN LAND

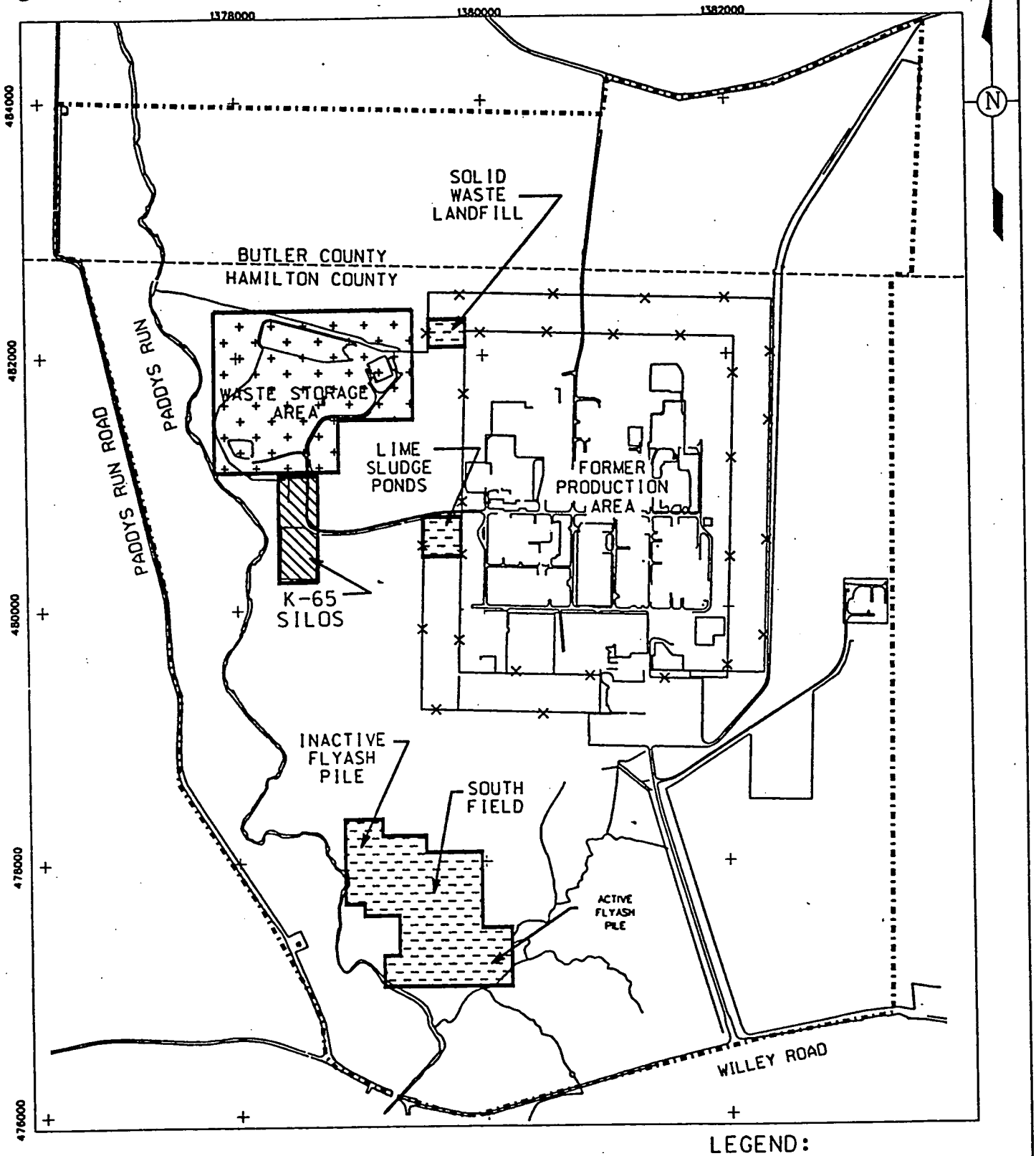
SCALE

2 1 0 2 MILES

000009

Projection: Ohio State Plane South
Unit: Feet
Datum: 1927 North American

Figure1-2 Site Map with Operable Units



LEGEND:

- OPERABLE UNIT 1
- OPERABLE UNIT 2
- OPERABLE UNIT 4
- FEMP BOUNDARY
- COUNTY LINE

NOTE:
OPERABLE UNIT 3 INCLUDES ALL BUILDINGS, PIPELINES, AND ABOVEGROUND STRUCTURES IN THE FORMER PRODUCTION AREA. OPERABLE UNIT 5 INCLUDES GROUNDWATER, SURFACE WATER, SOIL, SEDIMENT, FLORA AND FAUNA WITHIN THE REGIONAL AREA AS WELL AS THE FORMER PRODUCTION AREA.

000010

SCALE

1200 600 0 1200 FEET

SECTION 2.0 PROGRAM OBJECTIVES AND DATA USE

Ohio EPA has developed program and data use objectives to guide the sampling regimen in this Field Sampling Plan.

This Field Sampling Plan is being developed and implemented in order to :

- Monitor the impacts of past and ongoing releases at the Fernald site.
- Validate DOE's environmental monitoring program results.

The data obtained through the implementation of this Field Sampling Plan will be used to:

- Inform public of environmental impacts.
- Assist in minimizing impacts of remedial actions on the environment.
- Validate DOE's EMP.

SECTION 3.0 SAMPLING DESIGNS

INTRODUCTION

This section explains the sampling design. Each subsection identifies the media sampled, outlines the sampling objectives, summarizes the objectives used in selecting the locations, and provides the total number of samples to be collected in that media.

3.1 GRASS AND SOIL

The main objective for sampling soil and grass is to measure any potential impacts of remedial actions or site operations on the surrounding environment (i.e., possible airborne suspension and deposition of contamination from the site during remediation). At every location, a composite soil sample is collected along with a grass sample. The corresponding samples will help monitor remedial impacts from air emissions through the relationship between the amount of uranium being taken up by the grass, and the concentrations found in the soil.

Other considerations when selecting sampling points include:

a) On-site air monitoring station locations provide good sampling locations. One reason is that the network of air monitors was originally set up in a pattern that reflects the wind direction at the site. Secondly, a great amount of historical data exists from these locations for total uranium and trends are affectively monitored from them.

b) Preference in off-site sampling locations is given to areas most likely affected by dispersion of contamination from the disposal cell construction and other remedial activities.

Several issues influence where soil and grass sampling locations are selected. For example, an ideal soil and grass sampling point is one that is undisturbed. However, undisturbed locations are difficult to find in the Fernald area. This is due to the predominance of agriculture and mowed land. Another issue is the "right of entry" onto private property, which can significantly affect the availability of sampling locations. Considering these obstacles, the locations selected will be reviewed annually before the actual sampling event. Any changes from the list below, will be noted in future addendums to this plan and in the annual report.

Spring and early summer is the best time of year to collect soil and grass samples because it is the longest undisturbed period in terms of mowing.

3.1.1 LOCATIONS

Both independent and split sampling will be carried out for soil and grass media. Split samples will be collected at locations that are part of DOE's EMP. Independent samples will be obtained from locations which may or may not be a DOE sampling point.

The choice of sampling locations was influenced by wind direction and the potential effects from remedial activities taking place at the site. On-site locations will change in the future, due to construction of the disposal cell and other cleanup activities. An addendum will be added to the Sampling Design when the new on-site locations are selected. Until the disposal cell warrants

the new locations, samples will be collected from the following (also refer to Figure 3-1):

LOCATION	FREQUENCY	SAMPLE TYPE[1]	PARAMETERS
AMS02	Yearly/Early Spring	Split/Independent	Total Uranium
AMS03	Yearly/Early Spring	Split/Independent	Total Uranium
AMS08[3]	Yearly/Early Spring	Split/Independent	Total Uranium
Location 15	Yearly/Early Spring	Split/Independent	Total Uranium
Location 24	Yearly/Early Spring	Split/Independent	Total Uranium
Location 33	Yearly/Early Spring	Split/Independent	Total Uranium
BkgMT[2]	Yearly/Early Spring	Split/Independent	Total Uranium

[1]Locations chosen may or may not be split with FERMCO (yet to be determined).
[2]Background location.
[3]Backup or extra location.

3.1.2 NUMBER OF SAMPLES

The following is a list containing the number of grass and soil samples that will be collected for 1996. All samples will be handled the same, except for labelling and identification on the chain of custody (i.e., duplicate, matrix spike, and rinsate samples are collected for quality assurance/quality control purposes to check laboratory and sampling procedures). Changes will be made and added to an addendum to this plan.

A) Background Samples: 2
   -one for soil and one for grass
B) Duplicate Samples: 2
   -one for soil and one for grass
C) Matrix Spike Samples: 2
   -one for soil and one for grass
D) Rinsate Blank: 1
   -one per sampling event
E) Total Number of Routine Samples: 12
F) Total Number of Annual Samples: 19

3.1.3 ANALYTICAL METHOD

The analytical method selected for this media is Kinetic Phosphorescence Analysis (KPA). KPA was selected for its abiiity to detect low environmental levels of total uranium. For Ohio EPA's contract laboratory and FERMCO's to use the same analytical method, provides a mechanism for quality control on the split samples being analyzed.

3.2 PRIVATE WELLS

The main objectives for sampling private wells are:

a) Monitor plume movement and remediation effectiveness.
b) Monitor concentrations Total Uranium in potential drinking water.
c) Split sample a minimum 10% of the residential wells with DOE's EMP.

The monitoring of private wells will be affected by a public water supply line that will be operational in 1996. After the installation of the public water supply line, the number of residents and businesses utilizing groundwater wells will be reduced. Most private wells will be closed when the public water supply line is completed. If a well is to be kept open for agricultural or environmental monitoring purposes, installation of a backflow preventor is required. An addendum will be added to this sampling plan to show revisions to the sampling design resulting from the closure of wells.

3.2.1 LOCATIONS

Both independent and split sampling will be conducted for private well monitoring. Split samples will be collected at locations that are part of DOE's EMP. Independent samples will be obtained from locations which may or may not be a DOE sampling point.

Locations are a combination of residential and business wells most of which are situated on the edge or near the edge of the Fernald uranium plume. Five wells were selected out of a list of 33 private wells and will be sampled quarterly. The frequency of split sampling is being reduced from monthly to quarterly. This change is based upon past total uranium results, generally below 10 ppb. In addition, the background locations have been omitted from this plan, due to the substantial amount of background data that has been collected over the years. Sampling of DOE monitoring wells is not included in this sampling plan however, they may be added in the future.

The sampling locations include the following (also refer to Figure 3-2.):

LOCATION	FREQUENCY	SAMPLE TYPE	PARAMETERS
MKM13	Quarterly	Split	Total Uranium
DS-15	Quarterly	Split/Independent[1]	Total Uranium
NKM12	Quarterly	Split	Total Uranium
RS-39	Quarterly	Split/Independent[1]	Total Uranium
BOK14	Quarterly	Split	Total Uranium

[1]Split if DOE will sample, otherwise will be independent sample.

3.2.2 NUMBER OF SAMPLES

The following is a list containing the number of private well samples that will be

need to increase split sampling, changes will be made in an addendum to this plan.

Sampling stations in Paddy's Run and the Great Miami River are located where either elevated levels of contaminants have been found, impacts from remediation are likely, or data gaps exist (also refer to Figure 3-3).

LOCATION	FREQUENCY	SAMPLE TYPE	PARAMETERS
GMR RM 21.1 (BBW-03)	Quarterly	Split	Total U, Ra 226, Ra 228
GMR RM 26.2 (VBW-01)	Quarterly	Independent[1]	Total U, Ra 226, Ra 228
GMR RM 24.7 (Downstream from effluent)	Quarterly	Independent	Total U, Ra 226, Ra 228
Paddy's Run RM 1.8 (PWB-07)	Quarterly, When water present	Split	Total U, Ra 226, Ra 228
Paddy's Run RM 2.4 (PSF-11)	Quarterly, When water present	Split	Total U, Ra 226, Ra 228
Paddy's Run RM 7.2 (PR crosses Rt 748)	Quarterly	Independent[1]	Total U, Ra 226, Ra 228
Paddy's Run RM 3.3 (PRB-09)	Quarterly	Split	Total U, Ra 226, Ra 228
Paddy's Run RM 2.8 (PDS-10)	Quarterly	Split	Total U, Ra 226, Ra 228
Paddy's Run RM 0.2 (PR crosses Rt 128)	Quarterly	Independent	Total U, Ra 226, Ra 228

[1]Background

3.4.2 NUMBER OF SAMPLES

The following is a list containing the number of surface water samples that will be collected for 1996. All samples will be handled the same, except for labelling and identification on the chain of custody (i.e., duplicate, matrix spike, and rinsate samples are collected for quality assurance/quality control purposes of checking laboratory and sampling procedures). Changes will be added in an addendum to this plan.

A) Background Samples: 8

B) Duplicate Samples: 4
C) Matrix Spike Samples: 3
D) Rinsate Samples: To be determined
E) Independent Samples: 16
F) Split Samples: 16
G) Total Number of Samples: 43

3.4.3 ANALYTICAL METHOD

The analytical method selected for surface water is KPA. KPA was chosen due to the methods capabilities for analyzing low environmental levels of total uranium. For Ohio EPA's contract lab and FERMCO's, using the same analytical method provides a mechanism for quality control over the split samples being analyzed. Radium 226 and 228 will be analyzed using EMSL-LV-0539-17, the same method used by the USEPA Environmental Monitoring and Support Lab, Las Vegas, Nevada and published in their Radiochemical Analytical Procedures for Analysis of Environmental Samples; March 1979.

3.4 SEDIMENT

The objectives of the sediment monitoring program include:

a) Establish and maintain public confidence in DOE's EMP through split samples.
b) Determine if present and future pollution prevention measures are adequate.
c) Determine if DOE's current monitoring activities are sufficient to adequately carry out the objectives of their monitoring program.
d) Ensure that the public is informed about planned and unplanned releases of contaminants from Fernald.

The contaminants of concern from Fernald are most likely to be found in finer grained sediments. Past sampling results show that finer grained sediments most prevalent in the Spring. Therefore, sediment sampling will occur in the Spring.

3.4.1 LOCATIONS

Ohio EPA will continue to split samples with DOE and collect samples independently, as part of the sediment monitoring program. Two split sample locations will be selected from DOE's EMP. The two preferred sites include one on the Great Miami River in the vicinity of the confluence of Paddy's Run, and a second location along Paddy's Run between the Railroad and the Willey Road bridges (see Figure 3-4 for locations). Exact locations will be determined at the time of sample collection, due to the variable nature of sediment deposition.

Independent samples will be obtained from locations that may be adjacent to or in the vicinity of DOE's EM sampling points. The locations will be determined by quality and quantity of sediment deposition. Sampling locations selected include Paddy's Run near the Morgan Ross Road bridge, downstream of the railroad bridge, downstream of the pilot plant ditch near Route 128 bridge, on the Great Miami River near Venice Bridge, downstream of the effluent line, and downstream of the confluence of Paddy's Run (also refer to Figure 3-4).

LOCATION	FREQUENCY	SAMPLE TYPE	PARAMETERS
Paddy's Run RM 4.7[1] (P3BKG- Rt. 128 at the Morgan Ross Bridge)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
Paddy's Run between the RR bridge and Willey Road bridge	Spring	Split	Total U, Ra 226, Iso Th, Cs 137, particle size
Paddy's Run RM 3.3 (Location 6 - NW of Fernald, south of RR bridge)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
Paddy's Run RM 2.8 (Downstream of PP ditch, location PR031)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
Paddy's Run RM 0.2 (new location)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
GMR RM 20.3 (G8 - Confluence of PR and GMR)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
GMR at Paddy's Run	Spring	Split	Total U, Ra 226, IsoTh, Cs 137, particle size
GMR RM 26.2[1] (G2 - North of Venice bridge on east bank)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals
GMR RM 24.7 (G4 - Downstream of outfall, on sandbar's west bank)	Spring	Independent	Total U, Ra 226, Iso Th, Cs 137, particle size, TAL metals

[1]Background

3.4.2 NUMBER OF SAMPLES

The following is a list containing the number of sediment samples that will be collected for 1996. All samples will be handled the same, except for labelling and identification on the chain of custody (i.e., duplicate, matrix spike, and rinsate samples are collected for quality assurance/quality control purposes of checking laboratory and sampling procedures). Changes will be added in an addendum to this plan.

A) Background Samples: 2
B) Duplicate Sample: 1
C) Matrix Spike Sample: 1
D) Independent Samples: 7
E) Split Samples: 2
F) Total Number of Samples: 11

3.4.3 ANALYTICAL METHOD

The analytical method selected for sediment is KPA.. KPA was chosen due to the methods capabilities for analyzing low environmental levels of total uranium. For Ohio EPA's contract lab and FERMCO's, using the same analytical method provides a mechanism for quality control over the split samples being analyzed. Radium 226 and 228 will be analyzed using EMSL-LV-0539-17, the same method used by the USEPA Environmental Monitoring and Support Lab, Las Vegas, Nevada and published in their Radiochemical Analytical Procedures for Analysis of Environmental Samples; March 1979. Non-radiological analytes will be evaluated using Contract Laboratory Protocol (CLP) methodologies and particle size analysis done by ASTM D422.

3.5 FISH

Fish monitoring will be conducted to meet one or more of these three objectives:

a) Fish samples are collected to determine contaminants in fish flesh that may pose a consumption risk or to screen for environmental contaminants that are not easily detected or measured by other methods.
b) Aquatic organism exposure sampling is conducted to determine the level of contaminants to which aquatic organisms (i.e., fish) are exposed.
c) Determine if DOE's EMP activities are sufficient to adequately carry out the objectives of their monitoring program.

3.5.1 LOCATIONS

Ohio EPA will continue to split samples with DOE and collect samples independently, as part of the fish monitoring program. DOE contracts to conduct sampling in the Great Miami River. The samples are filleted and analyzed for total uranium. Split samples will be collected at the confluence of Paddy's Run and an independent location will be in Paddy's Run on-site. This sample will be analyzed for whole body analysis of total uranium (also refer to Figure 3-5).

LOCATION	FREQUENCY	SAMPLE TYPE	PARAMETERS
GMR RM 19	Autumn	Split (carp fillet) 500g	Total U
Paddy's Run RM 2.8	Autumn (when fish are present)	Independent (whole body) 500g	Total U

3.5.2 NUMBER OF SAMPLES

The following is a list containing the number of fish samples that will be collected for 1996. All samples will be handled the same, except for labelling and identification on the chain of custody (i.e., a matrix spike sample is collected for quality assurance/quality control purposes of checking laboratory and sampling procedures). Changes will be added in an addendum to this plan.

A) Split Sample: 1
B) Independent Sample: 1
C) Matrix Spike Sample: 1
D) Duplicate Samples: 0
E) Total Number of Samples: 3

3.5.3 ANALYTICAL METHOD

The analytical method selected for analyzing uranium in fish is KPA. KPA was chosen due to its capabilities for analyzing low environmental levels of total uranium. For Ohio EPA's contract lab and FERMCO's, using the same analytical method provides a mechanism for quality control over the split samples being analyzed.

3.6 PRODUCE AND SOIL

The main objective for sampling produce and soil is to measure any potential impacts of remedial actions or site operations on the surrounding environment (i.e., possible suspension and deposition of contamination at the site during remediation). Additional objectives include:

a) Performing a quality control check on DOE's produce sample results.
b) Providing the public with total uranium results from produce sold at local vegetable stands.

Several issues influence where produce and soil sampling locations are selected. For example, due to the low total uranium concentrations seen in the produce data (i.e., as shown in the 1993 Site Environmental Report), it does not appear to be cost effective to select additional independent sampling points for analyses. In addition, an ideal produce and soil sampling point is one that would be from a homeowners garden located within the Fernald area. However, obtaining this type of location on private property is difficult. To obtain entry to a privately owned garden, legal arrangements must be made with the property owner, frequently resulting in additional costs. With this issue, it is more cost effective for Ohio EPA to split samples with DOE at the local vegetable

stands in the Fernald area. Therefore, the decision was made to split samples on a limited variety of vegetables. Soil samples will be collected from accessible gardens where a produce sample can be collected, and where the property owner is agreeable to our entry.

Finally, the decision was made to split samples on a limited variety of vegetables which will be dependent on what varieties are in abundance. Soil samples will be collected from accessible gardens where a produce sample can be collected, and where the property owner is agreeable to our entry.

The appropriate time of year to collect produce is before harvest in the early fall. The types of vegetables available depend on the success of the local farmer's crops. Standard vegetables grown in the area and sold at the local stands include tomatoes, corn, potatoes, cucumber, zucchini, and green beans. In addition, composite soil samples are collected along with the produce. By collecting corresponding samples, the relationship between the amount of uranium being taken up by the produce and the concentrations in the soil can be evaluated.

3.6.1 LOCATIONS

A split sampling approach will be used for produce and soil. Due to DOE and Ohio EPA not previously splitting samples on this media, this approach will provide a mechanism for quality control by comparing laboratory results between Ohio EPA and DOE.
Samples will be collected from the following locations (also refer to Figure 3-6).

LOCATION	FREQUENCY/TIME of YEAR	SAMPLE TYPE	PARAMETERS
BRW-1	1/Early Fall	Split	Total Uranium
BRN-2	1/Early Fall	Split	Total Uranium
ATN-3[1]	1/Early Fall	Split	Total Uranium

[1]Backup or extra location.

3.6.2 NUMBER OF SAMPLES

The following is a list containing the number of produce and soil samples that will be collected for 1996. All samples will be handled the same, except for labelling and identification on the chain of custody (i.e., duplicate, matrix spike, and rinsate samples are collected for quality assurance/quality control purposes of checking laboratory and sampling procedures). Changes will be added in an addendum to this plan.

A) Duplicate Samples: 2
   -one for soil and one for produce
B) Matrix Spike Samples: 2
   -one for soil and one for produce

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C) Rinsate Blank: 1 (one per sampling event)
D) Total Number of Routine Samples: 4 (approximate/to be determined at the time of collection)
E) Total number of Annual Samples: 9 (approximate)

3.6.3 ANALYTICAL METHOD

The analytical method selected for produce and soil is KPA. KPA was selected for its method capabilities for analyzing low environmental levels of total uranium. For Ohio EPA's contract lab and FERMCO's, using the same analytical method provides a mechanism for quality control over the split samples being analyzed.

3.7 AIR

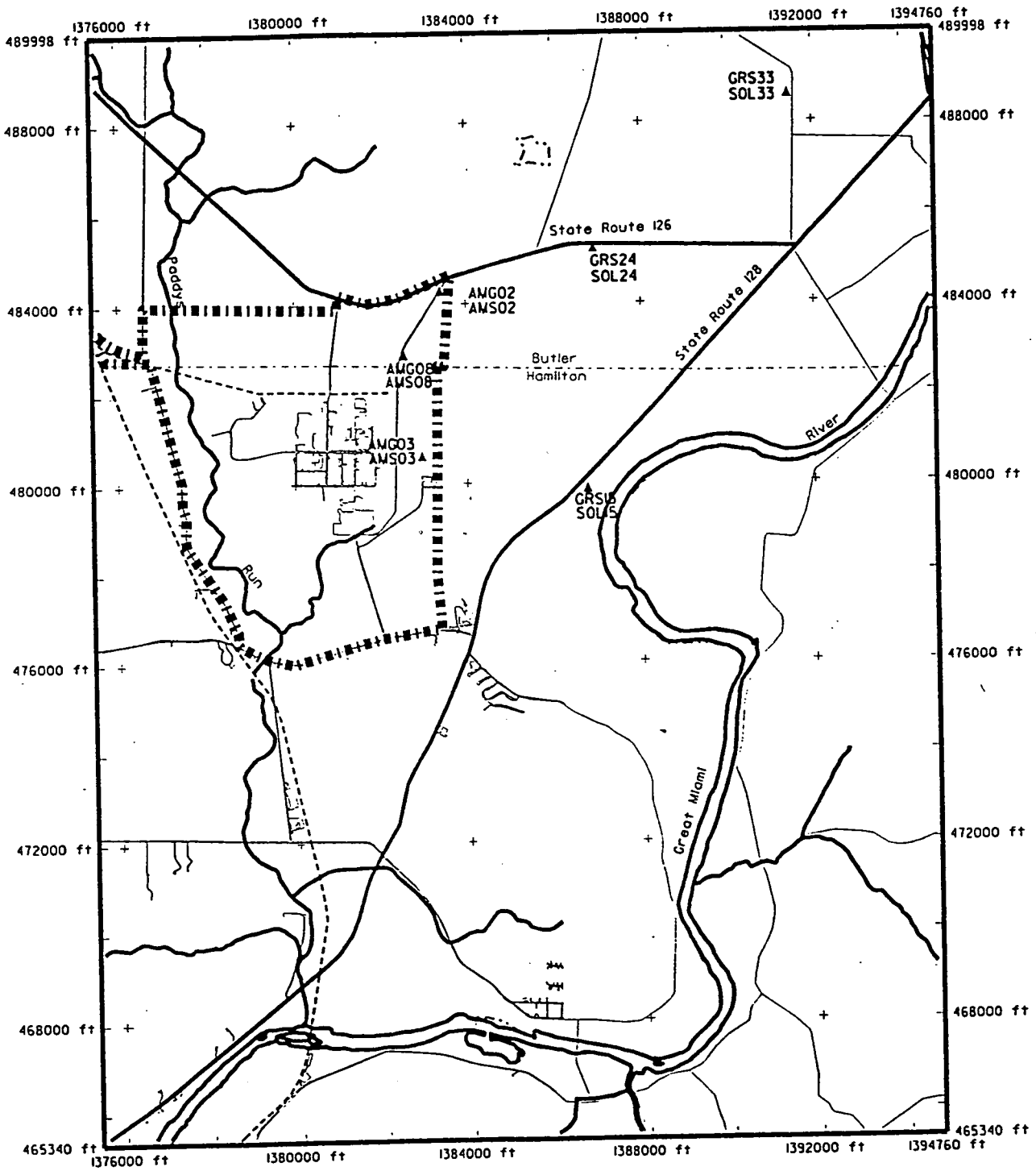
Information pertaining to the Air Sampling Design and procedures will be included in an addendum to be published during 1996.

TABLE 3a
ANALYTICAL METHODS SUMMARY

MATRIX	PARAMETERS[1]	METHODS
Soil and Grass	Total Uranium	KPA
Sediment	Total Uranium	KPA
	Isotopic Thorium	EERF 00-05[3]
	Radium 226	EERF RA-01
	Cesium 137	EMSL-LV-0539-17[4] (gamma spec)
	TAL Metals	CLP analysis
	Particle Size	ASTM D422
Air	To Be Determined	----[2]
Groundwater	Total Uranium	KPA
	Inorganics	SW-846(6010/7000A)
Surface Water	Total Uranium	KPA
	Radium 226	EMSL-LV-0539-17[4]
	Radium 228	EMSL-LV-0539-17[4]
Produce	Total Uranium	KPA

[1]Other parameters may be included for analysis, however, not on a regular basis.
[2]Air methods will be added when new lab contract goes into effect.
[3]USEPA Eastern Environmental Radiation Facility - Radiochemistry Procedures Manual, August 1987.
[4]USEPA Environmental Monitoring and Support Lab, Las Vegas, N.V. Radiochemical Analytical Procedures for Analysis of Environmental Samples; March 1979.

Figure 3-1 Ohio EPA Grass and Soil Sampling Locations



▲ Grass and Soil Sampling Locations
FEMP Boundary
Surface Water Body
Roads
Railways

Scale
0 2000 4000 6000 Feet

Projection Ohio State Plane South
Units Feet
Datum 1927 North American Datum
Produced by Ohio EPA (OFFO)

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Figure 3-2 Ohio EPA Residential Well Sampling Locations

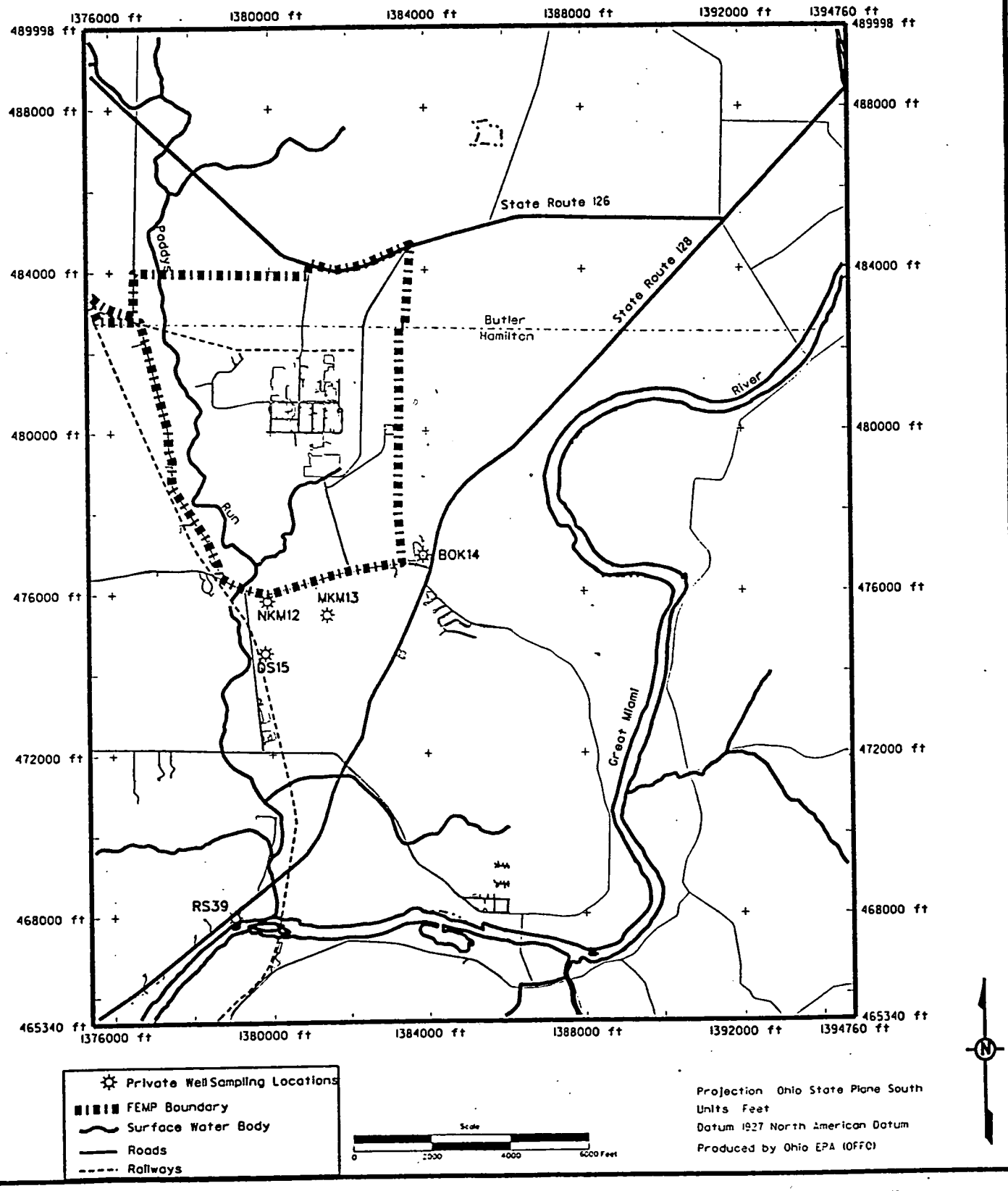

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Figure 3-3 Ohio EPA Surface Water Sampling Locations

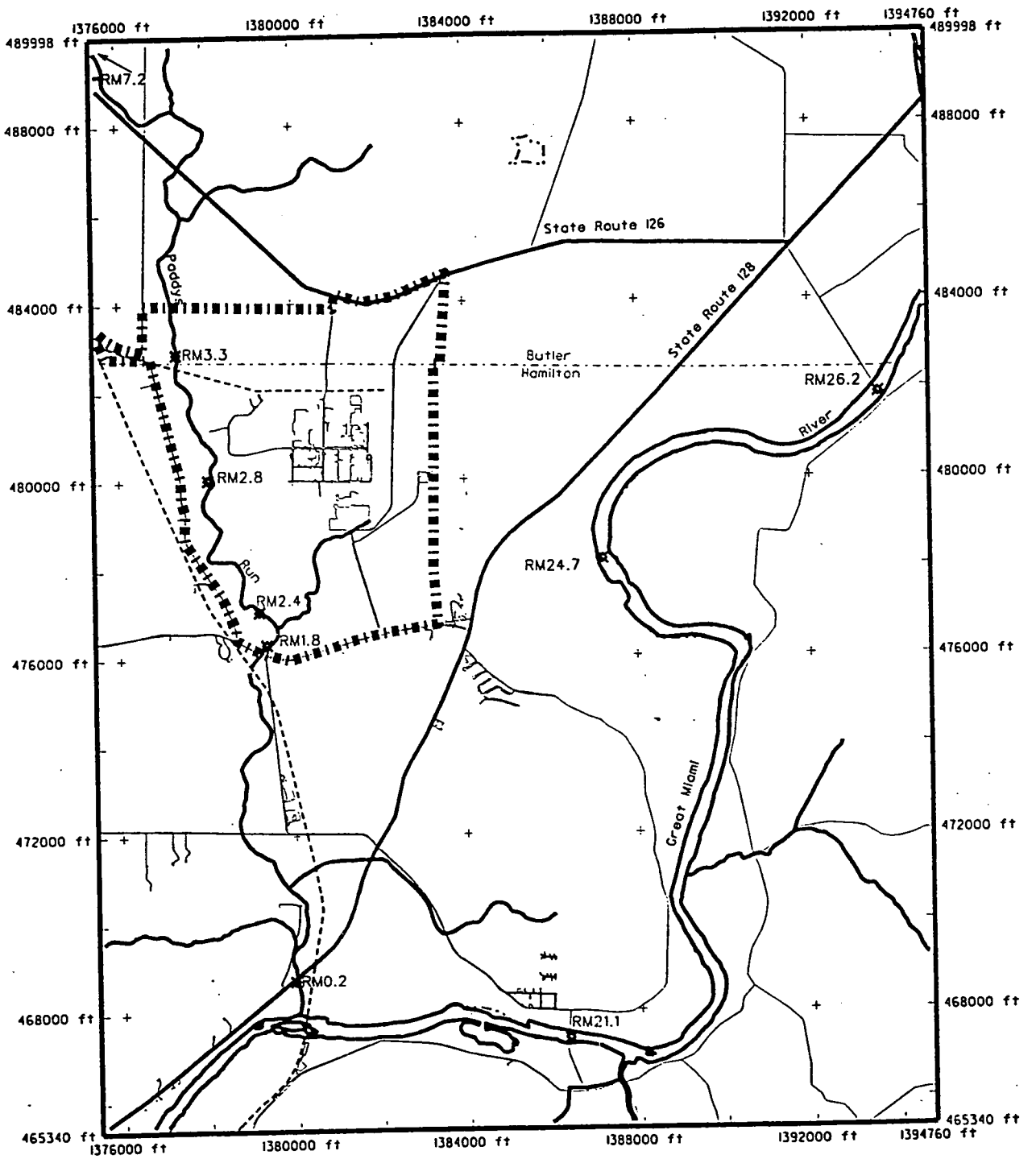

Figure 3-4 Ohio EPA Sediment Sampling Locations

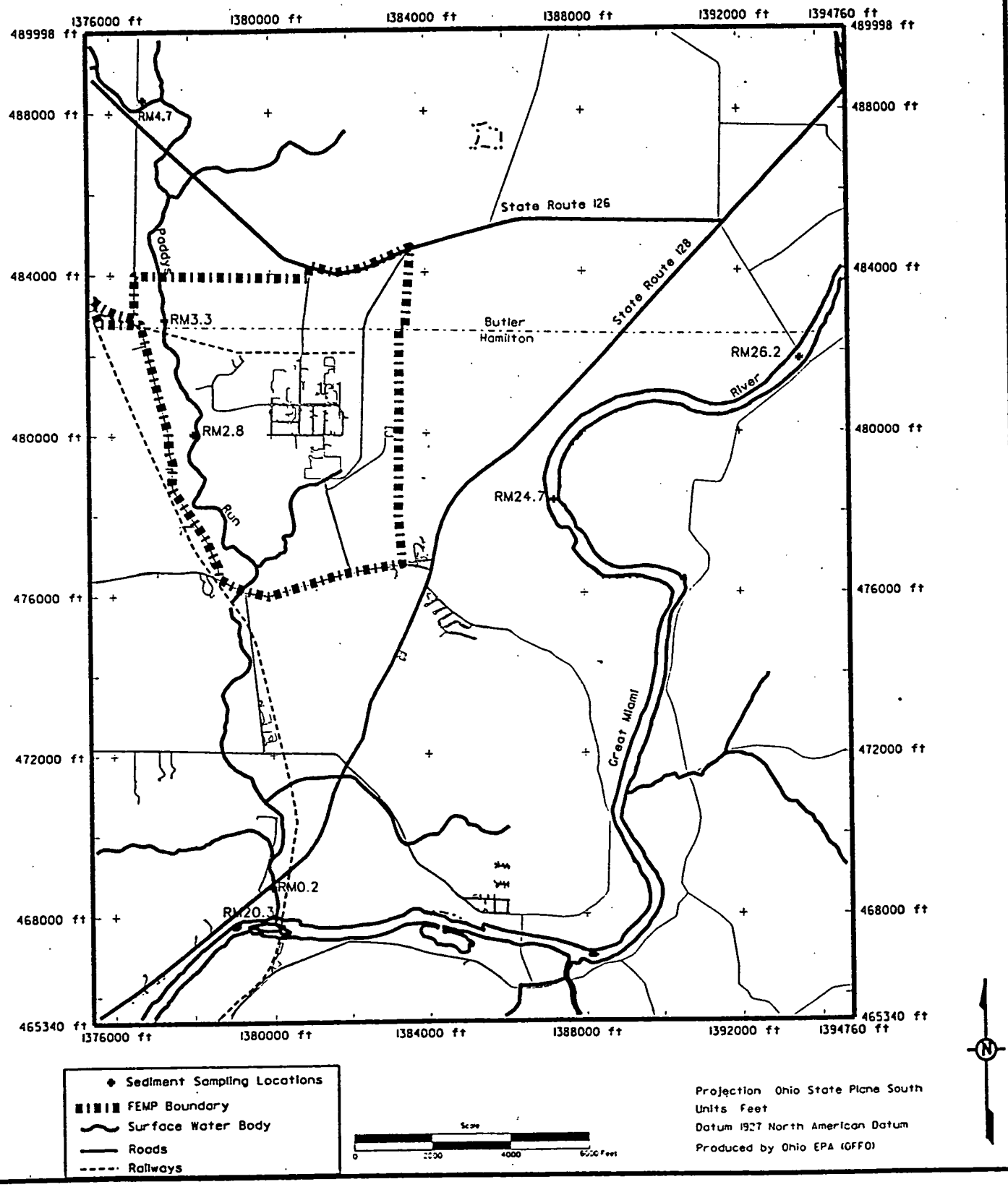

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Figure 3-5 Ohio EPA Fish Sampling Locations

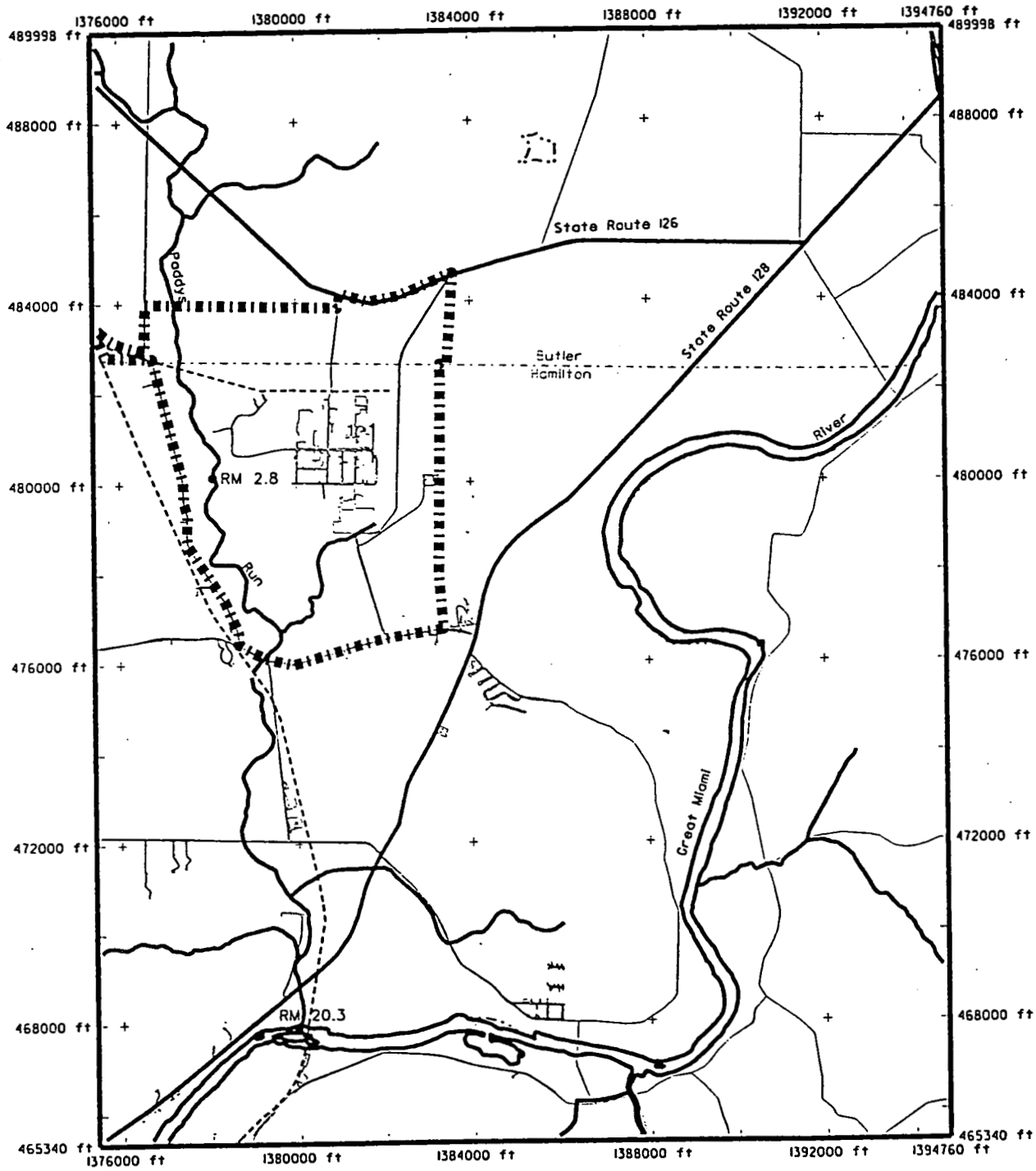
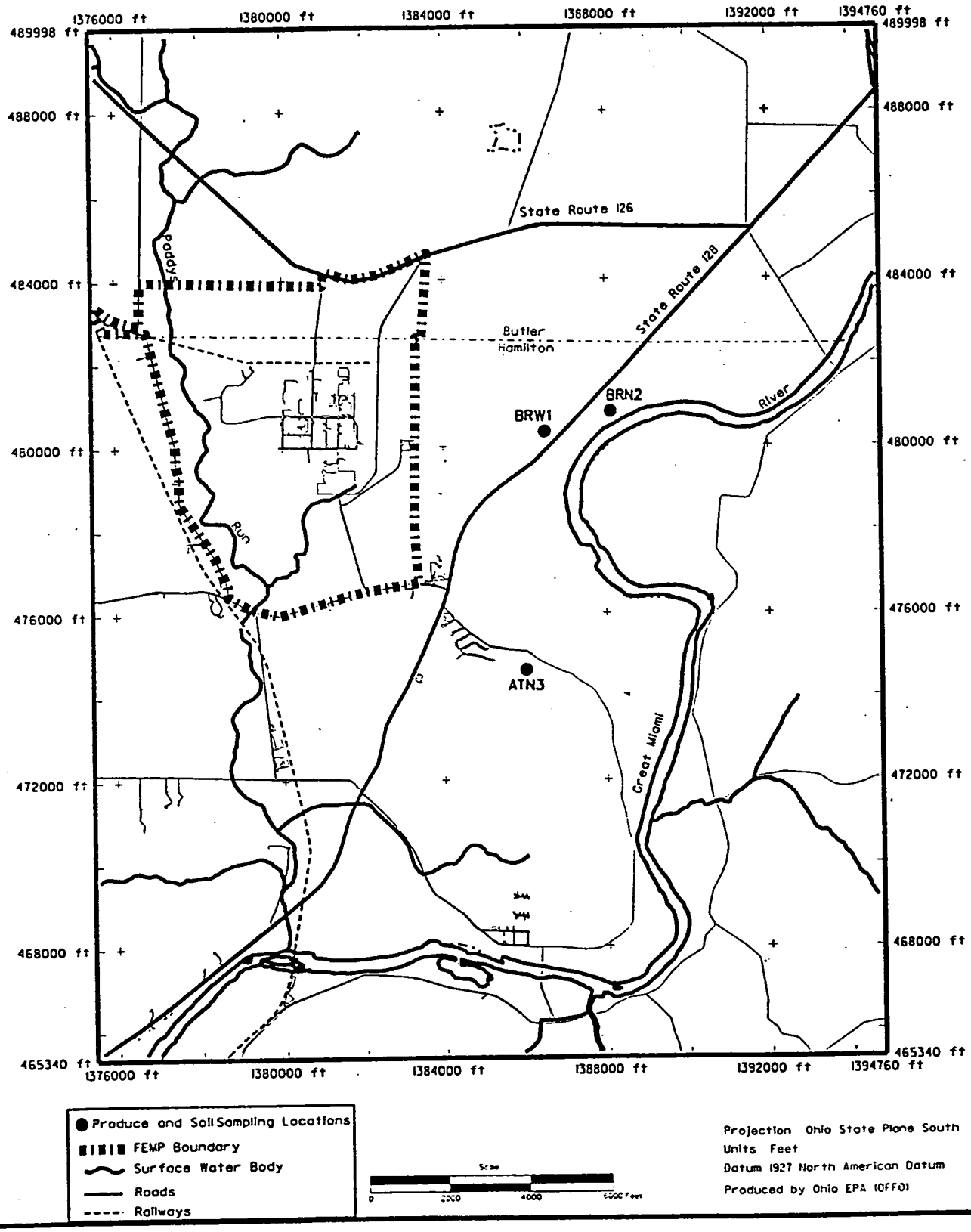


Figure 3-6 Ohio EPA Produce and Soil Sampling Locations



SECTION 4.0 FIELD SAMPLING REQUIREMENTS

The Sampling Requirements Summary, Tables 4.1 - 4.7b, contains information pertinent to sampling. The tables cover the parameters to be analyzed, media to sample, preservative, the sample volume required, type of sample containers, and the amount of containers needed for that sample. For air sampling, the tables will be added at a later date in an addendum to this plan.

TABLE 4.1 GRASS AND SOIL FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**	Parameter **Total Uranium**
MATRIX	GRASS	SOIL
VOLUME	500-1000 grams	500 grams
CONTAINER TYPE	One Gallon Plastic Bag	16 oz. Plastic Wide Mouth Jar
PRESERVATIVE	None	None
NUMBER OF CONTAINERS	2	1

TABLE 4.2 PRIVATE WELLS FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**
MATRIX	GROUNDWATER
VOLUME	1000 ml
CONTAINER TYPE	1000 ml Plastic Bottle
PRESERVATIVE	2-3 ml HNO_3
NUMBER OF CONTAINERS	1

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TABLE 4.3 SURFACE WATER FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**	Parameter **RA 226**	Parameter **RA 228**
MATRIX	SURFACE WATER	SURFACE WATER	SURFACE WATER
VOLUME	1000 ml	1000 ml	1000 ml
CONTAINER TYPE	1000 ml Plastic Bottle	1000 ml Plastic Bottle	1000 ml Plastic Bottle
PRESERVATIVE	2-3 ml HNO_3	2-3 ml HNO_3	2-3 ml HNO_3
NUMBER OF CONTAINERS	1	1	1

TABLE 4.4 SEDIMENT FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Radionuclides✧**	Parameter **TAL Metals**	Parameter **Particle Size**
MATRIX	SEDIMENT	SEDIMENT	SEDIMENT
VOLUME	500 grams	8 ounces	16 ounces
CONTAINER TYPE	16oz. Wide Mouth Plastic Jar	8oz. Wide Mouth Glass Jar	16oz. Wide Mouth Plastic/Glass Jar
PRESERVATIVE	None	None	None
NUMBER OF CONTAINERS	1	1	1

✧Radionuclides include: Total Uranium, Radium 226, Radium 228, Isotopic Thorium, and Cesium 137.

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TABLE 4.5 FISH
FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**
MATRIX	Fish
VOLUME	500 grams
CONTAINER TYPE	Aluminum Foil
PRESERVATIVE	Ice
NUMBER OF CONTAINERS	1

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TABLE 4.6 PRODUCE AND SOIL FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**	Parameter **Total Uranium**	Parameter **Total Uranium**	Parameter **Total Uranium**
MATRIX:	BEANS	TOMATOES	OTHER (zucchini, cucumber, corn, potatoes)	SOIL
VOLUME:	500-1000 grams	500-1000 grams	500-1000 grams	125 - 250 grams
CONTAINER TYPE:	One Gallon Plastic Bag	One Gallon Plastic Bag	One Gallon Plastic Bag	4oz. or 8oz. Wide Mouth Jar
PRESERVATIVE:	None	None	None	None
NUMBER OF CONTAINERS:	2	2	2	1

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TABLE 4.7a AIR (RESERVED) FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Total Uranium**	Parameter **Total Uranium**	Parameter **Total Uranium**	Parameter **Total Uranium**
MATRIX	AIR (ON SITE)	AIR (OFF SITE)	AIR (WASTE PIT AREA)	AIR (FENCELINE)
VOLUME				
CONTAINER TYPE				
PRESERVATIVE				
NUMBER OF CONTAINERS				

TABLE 4.7b AIR
FIELD SAMPLING SUMMARY

Information provided is per sample.	Parameter **Radon**	Parameter **Radon**	Parameter **Radon**
MATRIX	AIR (BACKGROUND)	AIR (FENCELINE)	AIR (OTHER)
VOLUME			
CONTAINER TYPE			
PRESERVATIVE			
NUMBER OF CONTAINERS			

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SECTION 5.0 STANDARD OPERATING PROCEDURES

INTRODUCTION

The sampling methods and techniques outlined in this Field Sampling Plan (FSP) are based upon environmental monitoring practices conducted at the Fernald site, Ohio EPA's field sampling methods and guidelines, USEPA guidelines, guidelines from the American Society for Testing and Materials, and others listed in the references. The procedures may vary or change as required however, the definitive procedure employed will be documented. Deviations from procedure during any given sampling event will be documented in the Field Logbook and evaluated for potential impacts on sample quality. Changes to the procedure based on site activities will be added in an addendum to the FSP.

Before conducting any on-site or off-site sampling activities, all Ohio EPA staff involved with sampling at the Fernald site must be familiar with Ohio EPA and FERMCO's environmental monitoring SOPs. Ohio EPA's SOPs are presented in this section of the FSP, and FERMCO's are covered in their document entitled, Radiological Environmental Monitoring Section Controlled Standard Operating Procedures Manual. The following procedures will ensure that all sampling efforts will maintain quality control in the field, throughout the handling and shipping process, and aid in ensuring the sampling team's health and safety.

5.1 PRE-SAMPLING ACTIVITIES

A. Sampling staff must be familiar with Ohio EPA's Field Sampling Plan, SOPs, and the Health and Safety Plan for the Fernald site.

B. Sampling staff must be familiar with DOE's EMP and FERMCO's Field Sampling Plan, SOPs, and FERMCO's site Health and Safety Plan.

C. When split sampling, coordinate with FERMCO sampling team.

D. Ensure all site access problems have been resolved and will not interfere with the sampling event.

E. Coordinate with laboratory.
   1. Type of samples.
   2. Sample volume required.
   3. Container types.
   4. Shipping arrangements.
   5. Order sample containers, preservative, COC forms, labels, etc.
      -A monthly inventory is automatically conducted on sampling supplies, an inventory sheet updated and distributed to sampling staff.

F. Prepare field log book. This includes all preliminary information such as the date,

staff participating in the sampling event, sampling locations, etc. (refer to SOP 8.1.1 (B)) and Attachment 8.1.1A).

G. Start paper work for sampling event (refer to SOP 8.0 and the appropriate Attachments):
   a) Chain of Custody (COC)
   b) Labels
   c) Shipping Forms
   d) Cooler Custody Seal

H. Log out thermoluminescent dosimeter (TLD) badges for sampling staff (refer to SOP 8.1.2 (C)).

I. Check and log out required number of coolers on the Cooler Inventory Log Sheet (refer to SOP 8.1.2 (A)). If coolers are still at the laboratory, contact the lab to locate them.

J. Get appropriate equipment ready for the specific sampling event (refer to SOP 5.1.1 and the media's appropriate SOP and its checklist).

K. Decontaminate equipment (see SOP 6.2 for details).

CHECKLIST 5.1

EQUIPMENT AND SUPPLIES CHECKLIST

1) Evidence tape
2) Clear packing tape
3) Utility knife
4) Preservative
5) Small 1 Liter cubitainer (acid ampule disposal)
6) Latex gloves
7) Rubber gloves
8) Trash bag
9) Paper Towels or Kimwipes®
10) Gallon and quart size sealable plastic bags
11) Pen and permanent marking pen
12) Log book and map
13) Labels, COC form, custody seal, courier forms, etc.
14) Field boots or safety boots (steel toes required when near heavy equipment or when using auger-type soil sampling equipment)
15) Thermoluminescent dosimeters (TLD) badge
16) Seasonal supplies (i.e., sun screen, etc.)
17) Decontamination Supplies (refer to Checklist 6.3.1)

5.2 GRASS AND SOIL SAMPLING PROCEDURES

Soil and grass samples will be collected and composited according to the following procedures (soil sampling method is based upon ASTM #C 998-90 and grass samples follow FERMCO's procedure EP-REM-012:SOP 6.5).

A. Review SOP 5.1 for Pre-Sampling Activities and prepare for sampling (i.e., equipment and supply prep).

B. Select sampling locations from predetermined list in the sampling design. Check to ensure that the area has not been disturbed, appears open, not protected from the wind, and has no hanging trees or bushes (refer to map??).

C. Using a braided rope or cord as a template, mark out a one meter square grid. Again using a premeasured rope, mark out 3 meters from the first grid to a second one meter grid.

D. Wearing latex gloves, remove all vegetation from inside the grids to a height of 20 mm above the soil. Place the grass into one large sealable plastic bag for composition. The desired amounts of grass collected must be >500 grams per sample (sample weight is determined according to laboratory specifications). Hang the plastic bag from the hook of a spring scale to determine correct weight. Once sample weight is determined, divide into two samples and place into separate sealable plastic bags.

E. Collect soil samples from the center and each corner of the grid. Clear area of any vegetation and stone where the sample is to be collected. Insert the auger or slam hammer into the soil surface to an adequate depth. Obtain a sample <15 centimeters deep. Contain the sample in the sampling apparatus.

F. Remove the soil plug from the slam hammer. Before dislodging the soil from the plug, remove any extraneous material (i.e., roots, twigs, leaves or debris) or cut off the top 5 cm from the sample. Loosen the soil sample from the plug and place into a stainless steel basin. Set sample aside until all samples are collected from one grid.

G. Repeat the previous step until 10 core samples (five collected from each grid) have been obtained.

H. Soil plugs are composited to obtain a homogeneous sample. Soil is mixed in a stainless steel basin. Make sure that any stone or organic material is completely removed before placing the soil into sample containers.

I. Complete sample identification label with the appropriate information (i.e., date,

sample I.D., time, collectors' name & parameter, etc., refer to SOP 8.1.3 & Checklist 8.1.3). If needed, wipe sample container with a Kimwipe® until dry. Place label on the container and cover with clear tape.

J. Seal container lids with evidence tape and place soil samples into sealable plastic bags.

K. Double bag grass samples for shipment and place evidence tape on the outside seal of the bag.

L. If grass samples will be retained for more than 24 hours, then ice must be used as a preservative in shipment (place ice in plastic bags). Ice is used to reduce odors.

M. Record all necessary information in the log book (i.e., sample number, location, time, field personnel, parameters, preservative, and field measurements when split sampling).

N. Decontaminate the sampling equipment (refer to SOP 6.0).

O. Check SOP 5.9 for Post-Sampling Activities.

CHECKLIST 5.2

EQUIPMENT CHECKLIST FOR SOIL AND GRASS SAMPLING

1) Grass shears
2) Soil sampling equipment (i.e., slam hammer)
3) Plastic sheets
4) Spring scale
5) Braided nylon line (2)
   -rope measuring the length of four meters
   -rope measuring the length of three meters
6) Stainless steel bowl
7) Stainless steel trowel
8) Sixteen ounce wide-mouth plastic or glass jars for soil samples
9) One or two-gallon sealable plastic bags for containing grass samples
10) Decon cooler
11) Refer to Checklist 5.1.1 for additional supplies
12) Refer to Checklist 6.3.1 for decontamination supplies

5.3 RESIDENTIAL WELL SAMPLING PROCEDURES

Groundwater samples will be collected according to the following procedures.

A. Review SOP 5.1 for Pre-Sampling Activities and prepare for sampling (i.e., equipment and supply prep).

B. Select sampling locations from predetermined list in the sampling design. (refer to Figure 3-2)

C. Before collecting a sample, disconnect all hoses, filters, water softeners, etc. from the faucet.

D. Allow faucet to run for at least one minute at a high volume to flush any rust, deposits and residue from the supply line.

E. Reduce water flow, and while wearing latex gloves fill sample bottle. If split sampling, fill bottle to half full and allow other party to partially fill their container(s). Then continue to completely fill bottles. Tilt container while filling and avoid touching the mouth of the bottle to the faucet. Be careful to avoid spillage and possible contamination of the outside of the containers.

F. Add 2-3 ml nitric acid (preservative amount determined by lab specification) to acidify sample and bring pH to a level of <2. Nitric acid is used for total uranium and total metals analyses. Place used acid ampule into a one liter plastic container (cubitainer) for disposal.

G. Complete sample identification label with the appropriate information (i.e., sample I.D., time, name, etc.). If needed, wipe sample bottle with a paper towel until dry. Place label on the bottle and cover with clear tape. Secure the bottle's cap with evidence tape and place the bottle in a sealable plastic bag.

H. Record all necessary information in the log book (i.e., sample number, location, time, field personnel, parameters, preservative, and field measurements when split sampling).

I. Check SOP 5.9 for Post-Sampling Activities.

CHECKLIST 5.3

EQUIPMENT CHECKLIST FOR RESIDENTIAL WELLS

1) One liter plastic bottles for water samples
2) One gallon sealable plastic bags
3) One liter plastic cubitainer (acid ampule disposal container)
4) Refer to Checklist 5.1.1 for additional supplies

5.4 SURFACE WATER SAMPLING PROCEDURES

Surface water samples will be collected according to the following procedures. A life preserver is required when sampling in waters >4 feet deep.

5.4.1 DISCREET GRAB SAMPLES

A. Review SOP 5.1 for Pre-Sampling Activities and prepare for sampling (i.e., equipment and supply prep).

B. Select sampling locations from predetermined list in the sampling design.

C. Start at most downstream or least contaminated site from sampling design (if practical).

D. Always take the sample from moving water that is most representative of the water being sampled (i.e. don't take a sample from a backwater area that may have floating debris).

E. Wear clean latex or latex blend gloves. If you are wading into a stream to collect a sample, be careful not to disturb the bottom sediments so as not to contaminate the sample. Stand downstream of the sample site.

F. Rinse the sample container and cap with ambient water. Do not rinse pre-preserved containers or those to be used for oil and grease. Be sure that the discarded rinsate will not contaminate the sample (e.g. do not discard rinsate upstream of your sample area or onshore where it will wash bank soil into your sample area).

G. Take the sample upstream from your hand (i.e. so that your hand is on the downstream side of the sampling container) and upstream of any other potential source of contamination. Submerge the container, opening face down, below the surface of the water approximately 30% of the total depth of the stream (if practical. Do not disturb bed sediments with the sample container). Fill the sample container by tipping it upwards facing upstream.

H. If collecting from a bridge using a rope and bucket/sampler avoid kicking bridge material into the bucket or submerging the rope in the sample. Rinse the sample container as in "F" above. Avoid collecting from bridges if possible, except as required in the case of split samples. Follow OEPA "Safety Procedures Concerning Bridge Use for Sampling or Reconnaissance".

I. If the sample becomes contaminated (i.e., debris from the bridge, your hand, sediments stirred up in the stream from walking, etc.), collect a new one.

J. If collecting samples for Biological Oxygen Demand or nutrients, fill container so that there is as little air as possible to reduce oxidation in the container.

K. Complete sample identification label with the appropriate information (i.e., sample I.D., time, name, etc.). If needed, wipe sample container with a Kimwipe® until dry. Place label on the container and cover with clear tape. Secure the container's cap with evidence tape and place the container in a sealable plastic bag.

L. Record all necessary information in the logbook (i.e., sample number, location, time, field personnel, parameters, preservative, and field measurements).

M. Check SOP 5.9 for Post-Sampling Activities.

CHECKLIST 5.4

EQUIPMENT CHECKLIST FOR SURFACE WATER

1) Waders
2) Rubber gloves
3) One liter plastic bottles
4) Rope
5) Life vest
6) Stainless steel bucket
7) Refer to Checklist 5.1.1 for additional supplies
8) Refer to Checklist 6.3.1 for decon supplies

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5.5 SEDIMENT SAMPLING PROCEDURES

Sediment samples will be collected and composited according to the following procedures. A life preserver is required when sampling in waters >4 feet deep.

A. Review SOP 5.1 for Pre-Sampling Activities.

B. Select sampling location from predetermined list in the sampling design. Locate a depositional area within the sampling site that contains recently deposited sediments that are <25% sand (i.e. bias the sample towards sediments less than 0.06 mm in diameter).

C. Wear clean gloves. Approach the sampling area from the downstream side so as not to disturb the sediments in the area to be sampled.

D. Rinse the sampling device and compositing container with ambient water. Do not disturb the sediments when rinsing the containers. Discard the rinsate so as not to contaminate the sample (e.g. do not discard the rinsate upstream of your sample area or onshore where it could wash bank soil into your sample area).

E. Carefully retrieve the sediments from the stream or pond bottom placing them into the compositing container. If using a scoop or spoon, lift through the water column slowly and carefully, otherwise the finer grained sediments may be washed from the sample. If using the Petite Ponar, operate by removing the solid pin and inserting the spring loaded pin. Exerting slight pressure will hold the pin in place. The pin will release automatically when the dredge hits the substrate. Retrieve as much of the finest grained sediments as possible.

F. Thoroughly mix the sediment in the compositing container prior to and during the filling of the sample containers.

G. If the sediment sample is to be analyzed for more than one parameter, fill the containers for the most volatile parameters first (i.e., TAL metals, radionuclides, particle size).

H. Complete sample identification label with the appropriate information (i.e., sample I.D., time, name, etc.). If needed, wipe sample container with a paper towel until dry. Place label on the container and cover with clear tape. Secure the containers lid with evidence tape and place in a sealable plastic bag.

H. Rinse equipment in ambient water prior to preparing for decontamination (see decontamination SOP 6.0) to remove gross sediment particles.

I. Check SOP 5.9 for Post-Sampling Activities.

CHECKLIST 5.5

EQUIPMENT AND SUPPLIES CHECK LIST FOR SEDIMENT

1) Waders
2) Rubber gloves
3) Sediment Sampling Devices (i.e., stainless steel spoons, spatulas, scoops, dredges)
4) Stainless steel basin
5) Life Vest
7) Sixteen ounce wide mouth plastic or glass jars
8) Rope for use with Petite Ponar
9) Decon Cooler
10) Refer to Checklist 5.1.1 for additional supplies
11) Refer to Checklist 6.3.1 for decon supplies

5.6 FISH SAMPLING PROCEDURES

Due to the specialized nature of fish collection and processing, fish sampling by electroshocking will be tasked out to the Ohio EPA Environmental Assessment Unit (OEPA/EAU). Other Ohio EPA staff will observe and/or assist the EAU personnel.

5.6.1 AQUATIC ORGANISM SAMPLE COLLECTION (FILLET)

A. Call Ohio EPA/EAU several weeks in advance to coordinate sampling. Complete OEPA/EAU tasking request form (see Form 5.6.1).

B. Fish will be collected as detailed in Volume III of the Ohio Environmental Protection Agency Biological Criteria for the Protection of Aquatic Life: Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (1989). They will be processed as detailed in Part 4 of Volume I of the Manual of the Ohio EPA surveillance Methods and Quality Assurance Practices (1991).

C. Samples must be placed on ice immediately and shipped to the laboratory on dry ice.

D. Check SOP 5.9 for Post-Sampling Activities.

E. Refer to checklist 5.1.1 for field supplies.

5.6.2 AQUATIC ORGANISM SAMPLE COLLECTION (WHOLE BODY)

A. Call OEPA/EAS to coordinate sampling . Complete OEPA/EAU tasking request form (see Form 5.6.1).

B. Fish will be collected as detailed in Volume III of the Ohio Environmental Protection Agency Biological Criteria for the Protection of Aquatic Life: Standardized Biological Field Sampling and Laboratory Methods for Assessing Fish and Macroinvertebrate Communities (1989). They will be processed as whole body composite samples as detailed in Part 4 of Volume 1 of the Manual of the Ohio EPA Surveillance Methods and Quality Assurance Practices (1991).

C. Samples must be placed on ice immediately and shipped to the laboratory on dry ice.

D. Check SOP 5.9 for Post-Sampling Activities.

E. Refer to checklist 5.1.1 for field supplies.

FORM 5.6.1 TASKING FORM

REQUEST FOR SAMPLING/TECHNICAL SUPPORT DERR-SIFU

To: Jeff Wander - SIFU Supervisor

From: _____ _____
(Name) (District)

Site Name: _____

County: _____ MSL#: _____

PLEASE ATTACH A NARRATIVE DESCRIPTION OF THE REQUESTED TASK

Type of Assistance Requested:

[ ] Plan and perform sampling event

[ ] Assist DO staff with sampling event (attach Sampling and Safety Plans)

[ ] Review/Comment of Sampling and/or Safety Plans

[ ] Other (please specify): _____

Date of Request: ____/____/____

Request Completion: ____/____/____

Names(s) of DERR personnel previously assigned to this site (if any): _____

FOR SIFU USE ONLY:

Date Received In Central Office: ____/____/____

Task Assigned To: _____ ____/____/____
(Name)

Assignment Completion Date: ____/____/____

Reviewer's Initials:

5.7 AIR SAMPLING PROCEDURES

Reserved.

5.8 PRODUCE AND SOIL SAMPLING PROCEDURES

Produce and soil samples will be collected and composited according to the following procedures.

5.8.1 VEGETABLE SAMPLE COLLECTION

A. Review SOP 5.1 for Pre-Sampling Activities and prepare for sampling (i.e., equipment and supply prep).

B. Select sampling locations from predetermined list in the sampling design.

C. At each produce stand, explain the purpose of the sampling to the property owner. Determine which types of produce to split sample based on what vegetables are available. If possible, select vegetables where owner has a garden in close vicinity of their stand. A soil sample should be collected in the same area as the vegetable plant. Select a location that is unprotected from the wind, not overgrown by trees, fairly undisturbed, and choose a plant that has an adequate amount of produce. If sampling from the owner's garden is not possible, fresh picked produce may be purchased. The produce should be unwashed and the owner must provide specific information on the time and location of the harvest.

D. When selecting vegetables from a garden, make sure they are in good condition and from the same plant. Place different types of vegetables in separate sealable plastic bags.

E. Using a field scale, weigh each sample. Each sample should weigh approximately 500
grams (weight of sample is according to laboratory specifications).

F. Once the sample is weighed, label and double bag for shipment.

G. Complete sample identification label with appropriate information (i.e., sample I.D., date, collectors' name, parameter, etc., refer to SOP 8.1.3 & Attachment 8.1.3). If needed, wipe sample bag with a Kimwipe® until dry. Place label on the first bag and cover with clear tape.

H. Place evidence tape across the seal of the second bag and place in cooler until samples can be prepared for shipping.

I. Record all necessary information in the log book (i.e., sample I.D., location, time, field personnel, parameters, weight, etc.).

5.8.2. SOIL SAMPLE COLLECTION

A. Using a stainless steel trowel, collect a grab surface soil sample from around and next to the same plant from which a vegetable sample was collected. Collect soil to a depth of 2-6 inches.

B. The soil samples are composited in a stainless steel pan to obtain a homogeneous sample. Any extraneous material (i.e., twigs, leaves, stone, etc.) is removed before placing the soil into separate containers.

C. Complete sample identification label with the appropriate information (i.e., date, sample I.D., collectors' name, parameter, etc., refer to SOP 8.1.3 & Attachment 8.1.3). If needed, wipe the sample container with a Kimwipe® until dry. Place label on the container and cover with clear tape.

D. Secure the container's lids with evidence tape and place in sealable plastic bags. Samples are placed in cooler until checked and packaged for shipment.

E. Record all necessary information in the log book (i.e., sample I.D., location, time, parameters, field measurements, etc.).

F. Decontaminate the sampling equipment (see SOP 6.0).

G. Check SOP 5.9 for Post-Sampling Activities.

CHECKLIST 5.8

EQUIPMENT CHECKLIST FOR PRODUCE AND SOIL

1) 4-8 oz. plastic jars
2) One gallon sealable plastic bags
3) Decon Cooler
4) Stainless steel trowel
5) Stainless steel basin
6) Spring scale
7) Money for cash produce sample purchase
8) Refer to Checklist 5.1.1 for additional supplies
9) Refer to Checklist 6.3.1 for decon supplies

5.9 POST-SAMPLING ACTIVITIES

Before leaving the field:

A. Make sure that all equipment is accounted for and decontaminated (if necessary).

B. If the sampling location has not been used before, mark the location using the Global Positioning System (GPS) to obtain a reading and describe the location in the logbook.

C. Ensure that all sample lids are secure and evidence tape is placed across the container-lids and/or plastic bags (depending on sample type). Make sure samples are placed in sealable plastic bags (if applicable) and placed inside the cooler for transport back to the office.

D. Complete all necessary entries in the logbook before leaving the field. When split sampling, complete all paperwork (DOE's sampling receipt) that documents split samples were collected.

SECTION 6.0 DECONTAMINATION PROCEDURES

INTRODUCTION

The goal of decontamination is to remove contaminants from equipment in order to avoid sample cross contamination. Decontamination procedures also reduce and/or eliminate the transfer of contaminants to clean areas, reduce personnel exposure to contaminants and prevent the mixing of incompatible substances.

The goal of most sampling efforts is to acquire representative samples and when decontamination is necessary, it is imperative that it is done accurately and thoroughly. Failure to decontaminate properly can result in inaccurate or invalid sampling results.

6.1 PRESAMPLING DECONTAMINATION PROCEDURES

Before leaving for the field, decontamination should be performed as followed:

1) While wearing latex gloves, wash equipment with a detergent solution (alconox®) at decontamination sink. If necessary, use a scrub brush (located in the equipment cabinet). Clean and rinse brush, if used.

2) Rinse with tap water.

3) Rinse with distilled/deionized water.

4) If testing for metals or radionuclides, rinse with a 10% Nitric Acid solution .

5) Rinse with distilled/deionized water.

6) Obtain rinsate blank to be shipped with samples (refer to SOP 6.2.1).

7) Dry with Kimwipe®, if necessary.

8) Place equipment in plastic bags seal thoroughly.

6.2 RINSATE BLANKS

Rinsate blanks are samples obtained by running analyte-free water over decontaminated sampling equipment. The sample is analyzed for residual contamination. When performing decontamination procedures, before sampling, one rinsate blank should be collected (per sampling event) before leaving for the field to ensure proper decontamination. The following volumes should be collected f or these specific parameters (if other parameters are to be collected, contact the laboratory for the volumes needed to run an analysis for the rinsate blanks:

Total U	At least 100ml
Isotopic Thorium and Radium 226	Total of 500 ml
Radium 228 and Cesium 137 (gamma spec)	Total of 500 ml

If at all possible, a double volume of rinsate should be collected in case the laboratory finds it necessary to conduct a reanalysis.

6.2.1 RINSATE BLANK PROCEDURES

Rinsate samples will be collected according to the following procedures.

A. Follow Pre-sampling Decontamination Procedures (SOP 6.1).

B. Collect the rinsate sample while conducting step (5) in SOP 6.1 (collect the blank in a sample container identical to the other samples). The rinsate sample must be treated as a regular water sample (follow SOP 5.3 (E) & (F)).

C. Complete the sample identification label with the appropriate information (i.e., sample I.D., time, etc.). If needed, wipe sample bottle with a paper towel until dry. Place label on the bottle and cover with clear tape. Secure the bottle's cap with evidence tape and place the bottle in a sealable plastic bag.

D. Record all necessary information in the log book (i.e., sample number, location, time, field personnel, parameters, preservative, etc.).

E. Check SOP 5.9 for Post-Sampling Activities.

6.3 FIELD DECONTAMINATION PROCEDURES

When decontamination takes place in the field, the preceding steps are to be repeated. All decontamination is to be performed over a designated cooler in which all rinsate will be collected. This cooler is to be placed on a large plastic sheet to avoid the spread of contaminated rinsate.

After all samples are collected in the field, the equipment should be decontaminated before leaving and placed in plastic trash bags and sealed with duct tape. Decon water will be properly disposed and treated on-site at Fernald's Waste Water Treatment Plant. Equipment can be stored directly from the field, but due to the infrequent use of these supplies, decontamination should be repeated prior to next use.

CHECKLIST 6.0

DECONTAMINATION CHECKLIST

1) Plastic wrap
2) Rinse bottles
3) Plastic bags for trash and equipment storage
4) Kimwipes®
5) Deionized/distilled water
6) Pressurized spray tanks
7) Large plastic container or Carboy® for distilled water
8) Decontamination cooler
9) Long handle scrub brushes
10) Alconox®
11) Funnel
12) Duct tape
13) 10% Nitric Acid solution
14) Latex Gloves

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SECTION 7.0 HANDLING, PACKAGING AND SHIPPING

INTRODUCTION

This SOP is a guide for the packaging and shipping of environmental samples to the laboratory. The following procedures are, in some parts, specifically designed for Ohio EPA's Southwest District/Office of Federal Facilities Oversight and their contract laboratory.

7.1 PROCEDURES

Follow procedures below when preparing environmental samples for shipment.

A. Recheck sample labels for legibility, any missing information, and cross-check with the corresponding COC.

B. Secure lids with tape.

C. Place sample container in a sealable plastic bag, if applicable.

D. When using glass containers, wrap with bubble wrap to prevent breakage.

E. In cooler, fill spaces between sample containers with sufficient amounts of cushioning material to prevent breakage during shipping (i.e., packing peanuts, vermiculite).

F. Complete and sign COC form and retain the pink copy for the file. Make two extra photocopies for Central Office and Data Manager.

G. Seal the COC in a sealable plastic bag and attach it to the inside lid of the cooler.

H. Seal cooler with clear packing tape and a custody seal.

I. Fill out an Ohio EPA address label with the laboratory's address. Secure the label with clear packing tape.

J. Fill out appropriate shipping form (depending on laboratory destination).

K. Contact Shipping Coordinator for courier pick up.

L. If a samples radioactivity is known to be greater than .002μCi/g, the Shipping Coordinator must contact the carrier for shipping regulations, possible restrictions, special labels and paperwork, and any additional requirements.

M. Packed coolers are placed at the courier pick up point on the fourth floor. The shipping form is placed on top of the cooler.

SECTION 8.0 SAMPLE CONTROL AND DOCUMENTATION

INTRODUCTION

The purpose of sample control and documentation is to ensure sample integrity throughout the entire sampling event and to certify that all information pertinent to the sampling activities is recorded. This section covers all the methods of documentation that will be used for sample identification, recording data, inventory tracking, chain-of-custody and other shipping paperwork requirements in each sampling event.

8.1 DOCUMENTATION PROCEDURES

All information relating to the sampling event is documented. The records used to document sampling information consist of a field logbook, photo I.D. log, cooler tracking sheet, equipment tracking sheet, and a TLD tracking sheet. In addition, the paperwork required for sample identification and shipment includes sample identification labels, photographs, chain-of-custody forms, and shipping forms. Below are descriptions of the tracking documents, which are followed-up by examples in Attachments 8.1.1a - 8.1.5.

8.1.1 LOGBOOK - FIELD NOTES AND PHOTOGRAPH IDENTIFICATION

A logbook is kept for recording all field activities and documenting photograph information. Prior to any sampling event, enter information that pertains to the sampling event except data or other specific information that is determined in the field.

A. The Field Logbook can be obtained from the environmental monitoring coordinator. All information pertaining to the sampling event must be recorded in the field logbook on numbered pages. Any recorded information should not be erased. When changing an entry, draw a line through the entry and write in the change above or beside the incorrect one. Write in your initials beside the incorrect entry and the date. In addition, all entries are signed and dated by the person making them.

1. Enter the following information in the Field Logbook.
   - Site, date, and type of sampling being conducted.

   - Names of contractors and Ohio EPA field staff.

   - Weather conditions and additional comments pertaining to any changes, difficulties, etc. in the sampling activities.

2. Enter sample information and associated activities:
   - Location description.

   - Sample I.D. and time collected.

- Collectors' name.

- Type of sample (soil, water, sediment, etc.)

- Analysis required.

- Preservative and technique (i.e. field preserved, volume of preservative, etc.).

- Volume of sample.

- Associated field measurements (recorded for media being sampled).

- Any deviations or anomalies noted.

B. Record information pertaining to photographs taken, in the Field Logbook. Enter information as follows (the same information pertains to photo-label):

- Name or intitials of photographer

- Type of camera.

- Date and time.

- Direction faced and description of subject.

- Site location.

- Sequential number of photograph and the roll number.

8.1.2 TRACKING SHEETS

For accounting purposes, tracking sheets are kept on sampling and field equipment such as coolers, sampling equipment and TLD badges. Prior to any sampling event, enter the appropriate information onto the tracking sheets that pertains to the equipment being used for the sampling event.

A. Coolers.

Coolers are logged in and out as they are used for the collection and shipment of samples. The log sheets are designed to keep track of each cooler's destination and location. The log sheet includes the cooler number, the date sent to the lab, the date returned, and the laboratory destination (see Attachment 8.1.2a).

B. Equipment.

Log all sampling equipment in and out as it is used for each sampling event. The log sheets

are designed to keep track of the equipment's location and destination. The log sheet includes the type of equipment, name, date logged out, date returned, and the name of the site where the equipment was used (refer to Attachment 8.1.2b).

C. TLDs

Log TLDs in and out as they are worn at each site. This log sheet is designed to keep track of all personal and visitor TLD badges for one quarter. The sign out sheet contains the TLD badge number, the date and time signed out, the date and time of return, the site visited, and any comments that may be pertinent for the Ohio EPA Safety Administrator (refer to Attachment 8.1.2.c).

8.1.3 SAMPLE LABELS

Sample identification labels are to be filled out with as much information as possible before going into the field. Once in the field and the sample has been collected, enter the additional information on the label and into the field logbook. Make sure the sample container is clean and dry before firmly attaching the label, and secure with clear tape (refer to Attachment 8.1.3).

In the event a label may become contaminated, illegible, or weather conditions cause the label not to adhere to the container, use a permanent marker to write the appropriate information on the sample container. As soon as possible, transcribe the information from the container and field logbook onto an appropriate label.

8.1.4 CHAIN OF CUSTODY

A chain of custody (COC) is a form which is a written record that accompanies samples from their collection through their analysis at the laboratory. A sample is in someone's custody when it is in their actual possession, meaning in someone's physical possession, locked up so that it is protected from tampering, and when the sample is kept in a secured area.

When shipping or transferring custody of the samples, the transferee should sign and record the date and time on the COC form. The form is then placed in a plastic bag and sealed to the inside of the lid of the cooler. Once at the laboratory, the COC is checked to ensure that the samples listed on the form are enclosed in the cooler. The form is signed again by laboratory personnel showing that the samples were received and a copy is included with the final data package (refer to Attachment 8.1.4).

8.1.5 CUSTODY SEAL

A custody seal demonstates that a sample container or cooler has not been tampered with or opened during shipment. The custody seal is placed over the sample container lid or edge of the cooler's lid with the senders signature and the date written on the seal. Evidence tape can be used instead of the seal, it serves the same purpose. As long as the seal is in place and not broken, it is a way to communicate to the laboratory that the sample's integrity is insured (refer to Attachment 8.1.5).

ATTACHMENT 8.1.1a
FIELD LOGBOOK

Documentation per sampling event
page 1

Site Name:

Date:

Type of Sampling:

Contractor:
Names:

Ohio EPA Field Staff:

Weather Conditions:

Comments:

Documentation per sample
page 2

Location:

Sample ID:

Time:

Collected by:

Type of Sample:

Parameter:

Preservative:

Volume of Sample:

Field Measurements (i.e., pH, conductivity, dissolved O_2, etc.):

Other (i.e., media conditions, color, consistency, etc.):

Comments:

ATTACHMENT 8.1.1b
PHOTO LOG

page 1

Name of Photographer:

Type of Camera:

Date:

Time:

Direction Faced:

Description:

Site Location:

Photo #:

Roll #:

page 2

Picture Label

Name of Photographer:	
Type of Camera:	
Date:	Time:
Direction Faced:	
Site Location:	
Photo #	Roll #

ATTACHMENT 8.1.2a
COOLER TRACKING SHEET

NUMBER	DESTINATION LAB	DATE OUT	DATE RETURN

ATTACHMENT 8.1.2b
EQUIPMENT TRACKING SHEET

EQUIPMENT USED	NAME / DIVISION	SITE	DATE OUT	DATE RETURNED

ATTACHMENT 8.1.2c
TLD TRACKING SHEET

QTR. BEGIN __/__/__
QTR. END __/__/__

Personal Badge #	Date/Time Signed Out	Date/Time Returned	Comments
NAME (#)			
NAME (#)			
NAME (#)			

ATTACHMENT 8.1.3
SAMPLE LABEL

SAMPLE LOCATION:
_____
DATE:_____ TIME:____
SAMPLE TYPE:_____
SAMPLE ID NO.:_____
SAMPLED BY:_____
TYPE OF PRESERVATIVE ADDED:
_____
REMARKS:_____

ATTACHMENT 8.1.4
CHAIN OF CUSTODY

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Page ____ of ____

Report to: _____

Lab Contact _____

Purchase Order No. _____

Project Reference _____

Bill to: _____

Telephone: _____

ONE CONTAINER PER LINE

Sample Number	Sample Type/Description	Date Collected	Container Type	Pre-servative	Required Tests	Condition on Receipt (Lab)

Possible Hazard Identification:
Non-hazard Flammable Skin Irritant Other

Sample Disposal:
Return to Client Disposal by Lab Archive (mos)

Turnaround Time Required:
Normal Rush Report Required By

QA Requirements:

1. Relinquished by
Signature/Affiliation Date

1. Received by
Signature/Affiliation Date

2. Relinquished by
Signature/Affiliation Date

2. Received by
Signature/Affiliation Date

Special Instructional Comments:

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ATTACHMENT 8.1.4

CHAIN OF CUSTODY

ATTACHMENT 8.1.5
CUSTODY SEAL

CUSTODY SEAL Site:_____ Date:_____
Signature:_____ Printed Name:_____

SECTION 9.0 DATA VALIDATION

INTRODUCTION

Data validation is performed to determine the validity and useability of analytical data. This process is conducted by the Ohio Department of Health/Bureau of Radiation Protection (ODH/BRP) on radiological data for Ohio EPA's Environmental Monitoring Programs.

9.1 DATA VALIDATION PROCEDURES

Data validation is performed using the following requirements:

A. Analytical minimum detection activity/method detection limit (MDA/MDL) as required by Ohio EPA lab contract.

B. Sample preparation and transfer data including pH and sample integrity

C. Analytical methodology as required by Ohio EPA

D. Chain of custody form information

E. Quality control samples.

F. Verification of sampling holding times.

G. Mass spectral tuning*

H. Initial and daily calibration of instruments*

I. System checks (instrument signal-to-noise ratio, drift, linearity, etc)*

J. Documentation of inventory control of chemicals used for testing, i.e., shelf life.*

K. Documentation of routine maintenance activity.*

*These are requirements that will be reviewed on a quarterly basis as part of the Quality Assurance/Quality Control Program.

9.1.1 MDA and MDL

Ohio EPA and FERMCO utilize the same and/or similar detection limits and analytical methods for analyses of their samples. Both FERMCO and Ohio EPA split samples, as well as collect independent samples. ODH/BRP reviews the laboratory data sheets to ensure compliance with the specified detection levels. The analytical criteria is outlined on the chain of custody form, which ODH/BRP reviews in conjunction with the laboratory data sheet. The sample integrity is checked upon receipt by the laboratory and noted on the chain

of custody form. ODH/BRP's chain of custody review determines compliance with preservation requirements, holding times, and sample container requirements.

If the radioanalytical MDA/MDL is not in accordance with the requested MDA/MDL, the differential value is compared to the over all resultant analytical data. This comparison allows the validator to "make a judgement call" as to whether the statistical difference between the requested MDA/MDL and the actual MDA/MDL impacts the quality of the data and the data usability.

9.1.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Laboratory quality assurance/quality control samples are in the form of a duplicate sample, a blank sample, and a matrix spike sample.

A. A duplicate sample is split from the primary sample of interest. Analysis of the duplicate sample provides analytical data which serves as an indicator of the laboratory precision.

B. A control limit of +/- 20% (35% for soil) for the Relative Percent Difference (RPD) shall be used for sample values > 5 times the MDA/MDL.

A control limit of +/- MDA/MDL (2 times MDA/MDL for soil) shall be used for sample values < 5 times MDA/MDL, including the case when only one of the duplicate sample values is < 5 times MDA/MDL.

C. A check is performed on the raw data by recalculating one or more RPD using the following equation to verify that the results have been correctly reported on the Laboratory Data Sheet.

$$RPD = S-D/((S+D)/2)) \times 100$$

S = First sample value (original)
D = Second sample value (duplicate)

If duplicate analysis results for a particular analyte fall outside the appropriate control window, the results are qualified for that analyte in all associated samples of the same matrix as estimated (J).

D. The blank analyses results determine the existence and magnitude of contamination problems within the analytical laboratory. If a contaminant is found to be present in the blank, then the associated data is evaluated to determine the extent of the impact that this poses on the data.

Action in the case of unsuitable blank results depends on the circumstances and origin of the blank. Sample results > Instrument Detection Limit (IDL) but < 5.5 times the amount in any blank shall be qualified as (U).

Any blank with a negative result whose absolute value is > IDL is carefully evaluated to determine its effect on the sample data.

E. The matrix spike sample is a portion of the sample to which there has been added a measurable amount of the contaminant of concern. The sample is subsequently analyzed to determine if the sample matrix (or composition) interferes with the analysis of the analyte (s) of interest.

Matrix spike recovery (%R) must be within the limits of 75-125%. However, spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of 4 or more.

F. The raw data is checked by recalculating one or more %R using the following equation to verify that results were correctly reported.

$$\%R = ((SSR-SR)/SA) \times 100$$

SSR = Spiked sample result
SR = Sample result
SA = Spike added

If the spike recovery is >125% and the reported sample results are <IDL, the data is acceptable for use. If the spike recovery is >125% or <75% and the sample results are >IDL, the data is qualified for these samples as estimated (J). If the spike recovery falls within the range of 30% - 74% and the sample results are <IDL, the data is qualified for these samples as estimated (UJ). If spike recovery results fall <30% and the sample results are <IDL, the data is qualified for these samples as unusable (R).

The USEPA guideline does not address the scenario (a) if the spike recovery falls within the range of 30 - 74% and the sample results are >IDL or (b) if the spike recovery results fall <30% and the sample results are >IDL.

G. As with many validation scenarios, the review is often left to the interpretation of the validator. In the above scenarios, a determination of a (J) qualification would be the most probable response, based upon other validation parameters. For example, if the spike recovery fell within 30 - 74% and the results were >IDL, and all other validation parameters were in accordance with guidelines, then the data would be validated (J). This is in contrast to if the spike recovery fell within 30 - 74% and the results were >IDL however, anomalies existed in the other validation parameters, then

the data would be validated (R).

H. The objectives of holding times is to ascertain the validity of results based on the holding time of the sample from time of collection to time of analysis. It should be noted that the holding time is based on the date of collection, rather than verified time of sample receipt, and date of digestion/distillation or process. It is a technical evaluation rather than a contractual requirement.

Actual holding times are established by comparing the sampling date (as indicated on the chain of custody) to the dates of analysis (as indicated on the laboratory data sheet). Sample preservation is indicated on the chain of custody and is verified as an aspect of the laboratory receipt process.

If holding times and preservation are not met, then the data is qualified > Instrument Detection Limit (IDL) as estimated (J) and results <IDL as estimated (UJ). If holding times are exceeded, professional judgement is used to determine the reliability of the data and the effects of additional storage on the sample results. The expected bias would be low and the data results may be determined <IDL as unusable (R).

9.2 DATA QUALIFIER DEFINITIONS

Data validation code letters and definitions used as the "qualifiers".

J - The associated value is an estimated quantity.

R - The data are unusable.

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

DEFINITIONS

Back Flow Preventor	a device designed to prevent contamination from entering into public water system in the event of a loss of water pressure or backpressure.
Calibration:	fine tuning an instrument to function properly against a known standard.
Carboy:	a plastic jug used for holding water.
Composite Soil Sample:	a sample prepared by physically combining portions of individual soil samples in a compositing container.
Composite Surface Water Sample:	a mixture of discrete samples taken at equal intervals over the compositing period or proportional to the water flow rate over the compositing period.
Compositing Container:	a large stainless steel bowl or tray used to combine several sediment samples from a site. Individual scoops of sediment are placed in the compositing container and thoroughly mixed before filling the sample containers.
Data Qualifiers:	criteria used during data validation process to classify sampled data as to its conformance to quality control requirements.
Data Use Objective:	a statement used to assure that data generated meets its intended use.
Data Validation:	process utilizing quality control (QC) measures to judge data usability.
Duplicate Sample:	an extra sample collected from one source and stored in a separate container which is treated separately throughout the handling and analytical process. This sample is used to assess laboratory error associated with sample methodology and analytical procedures.
Electrofishing:	a method of capturing fish by transmitting pulsed direct current (DC) through the water with an arrangement of anodes and cathodes. The electricity stuns fish so that they can be captured easily in nets.

Global Positioning System:	A Global Positioning System (GPS) is a location system developed by the Department of Defense (DOD) as a worldwide navigation and positioning resource, for military and civilian use. GPS uses a series of 24 orbiting satellites with a hand-held receiver to detect the position of an object.
Grab Sample (discreet and integrated):	an individual sample collected over a time-period not exceeding 15 minutes. Grab samples are appropriate to characterize a stream and for corroboration of composite sampling.
Independent Sample:	(for the purposes of this report) is an environmental sample of any material (sediment, groundwater, surface water, etc.) to determine the concentrations of contamination that exist in the material. This sample is collected by Ohio EPA/OFFO staff without an equivalent sample collected from FERMCO and/or DOE.
Instrument Detection Limit: (IDL)	the lower limit of contaminant concentration that an instrument can be detected. (IDL<MDL)
Matrix Spike Sample:	a laboratory sample with a known concentration of a target analyte added to verify percent recoveries, matrix interferences, and used to monitor laboratory performance.
Minimum Detection Limit (MDL):	the lowest amount that can be distinguished from the normal noise of an analytical instrument or method.
Minimum Detectable Activity (MDA):	(also known as the LLD that is) the smallest quantity of sample radioactivity that will yield a net count for which there is a predetermined level of confidence that radioactivity is present.
Quality Assurance/ Quality Control:	a system of procedures, checks, audits, and corrective actions to ensure that all environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.
Record of Decision:	a public document that explains which cleanup alternatives will be used at a National Priority List site.
Right of Entry:	a document or agreement establishing legal permission to enter or be on someone's property for a specific purpose.

Rinsate Blank Sample:	a sample obtained by running analyte-free water over decontaminated sampling equipment to test for residual contamination.
Sampling Design:	is a plan for establishing the type of media to be sampled, the objectives of the sampling locations, sampling frequency, analytical method to be used, and how many samples are to be collected.
Split Sample:	a sample collected from one location and divided in half between two parties. The samples are sent to two different labs for analyses. This process checks laboratory quality control.
Thermoluminescent Dosimeter(TLD):	A small clip-like badge that contains film that monitors an individual's external gamma radiation exposure.

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