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SUBMITTAL OF AIR MONITORING PLAN FOR THE ON-SITE DISPOSAL FACILITY

08/27/96

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LETTER

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Department of Energy

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AUG 27 1996
DOE-1282-96

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Dear Mr. Saric and Mr. Schneider:

SUBMITTAL OF AIR MONITORING PLAN FOR THE ON-SITE DISPOSAL FACILITY

This letter submits the Air Monitoring Plan for the On-Site Disposal Facility (OSDF) for your review in accordance with the OSDF Remedial Action Work Plan's (RAWP) Table 6-1 schedule. This plan has been revised to address comments from the U.S. Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA). A copy of this plan is also being provided to the Environmental Monitoring Subcommittee of the Fernald Citizens Task Force pursuant to their request from a recent Task Force subcommittee meeting.

If there are any questions, please contact Rod Warner at (513) 648-3156.

Sincerely,

for Johnny Reising
Fernald Remedial Action
Project Manager

FEMP:Warner

Enclosure: As Stated

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INSTRUCTIONS

1. Please replace the Table of Contents page in the Support Plans binder with that enclosed.

2. Please insert the enclosed Air Monitoring Plan into the Support Plans binder as Tab 10.

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AIR MONITORING PLAN

ON-SITE DISPOSAL FACILITY

20100-PL-002
Revision F
August 1996

FOR INFORMATION ONLY

United States Department of Energy

Fernald Environmental Management Project
Fernald, Ohio

Prepared by

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Under Contract DE-AC24-920R21972

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LIST OF ACRONYMS & ABBREVIATIONS

AIP	Agreement in Principle
ALARA	as low as reasonably achievable
AMS	air monitoring station
ANSI	American National Standards Institute
ARARs	applicable or relevant and appropriate requirements
ASL	analytical support level
BAMR	Borrow Area Management and Restoration Plan
CFR	Code of Federal Regulations
DCG	Derived Concentration Guideline
DCP	Design Criteria Package
DOE	United States Department of Energy
DQOs	data quality objectives
EDE	effective dose equivalent
EMP	Environmental Monitoring Plan
EPA	United States Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FS	Feasibility Study
IEMP	Integrated Environmental Monitoring Plan
IMP	Impacted Materials Placement Plan
m	meter(s)
m^3/min	cubic meter(s) per minute
mg/m^3	milligram(s) per cubic meter
mrem	millirem
NESHAP	National Emissions Standards for Hazardous Air Pollutants
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
OSDF	On-Site Disposal Facility
OU	Operable Unit (as numbered)
PEIC	Public Environmental Information Center
pCi/m^3	picoCurie(s) per cubic meter
pCi/ug	picoCurie(s) per microgram
ROD	Record of Decision
TBCs	to be considered criteria
TLDs	thermoluminescent dosimeters
ug	microgram(s)
ug/m^3	micrograms per cubic meter
WAC	waste acceptance criteria

1. INTRODUCTION

1.1 OVERVIEW

This Air Monitoring Plan describes the *environmental* air monitoring activities that will be undertaken during construction, impacted material placement, and closure of the On-Site Disposal Facility (OSDF) at the Fernald Environmental Management Project (FEMP), Fernald, Ohio. *Occupational* (including radiological safety) monitoring are outside the scope of this plan. Administrative and engineering control techniques, including reasonably available control measures as listed in Ohio Administrative Code (OAC) 3745-17-08(B), will be implemented as part of the OSDF construction to mitigate potential emission of fugitive dust and particulate radionuclide emissions from the OSDF. OSDF air monitoring program activities will include using environmental air monitoring equipment at the FEMP property boundary to monitor the potential public exposure to airborne particulate radionuclide emissions that may occur. This environmental air data will be used to provide verification that such engineering and administrative controls are effective in controlling emissions, and that airborne emissions are within predicted ranges and below environmental regulatory compliance guidelines. This OSDF Air Monitoring Plan does not address air monitoring activities during the post-closure period of the OSDF; those activities are to be addressed in a plan to be developed later (anticipated to be a future revision of the *Integrated Environmental Monitoring Plan*).

Air monitoring for the OSDF remedial action project must be compatible with the FEMP site air monitoring programs to provide readily comparable information and data. Hence, the two existing site air emissions monitoring programs will support the OSDF remedial action project: the Occupational Air Monitoring Program and the Fernald site-wide Environmental Monitoring Program. Both the Environmental Monitoring Program and the Occupational Air Monitoring Program will continue to be implemented throughout the OSDF remedial action project. The environmental air emission monitoring program for the OSDF uses the air monitoring stations, locations, equipment, procedures, and analytical methods from the *Integrated Environmental Monitoring Plan (IEMP)* [DOE, 1996b], the successor to the *Fernald Site Environmental Monitoring Plan* [FERMCO, 1995a], in order to provide data for annual 40 CFR Part 61 NESHAP Subpart H reporting and for other site environmental reporting.

Radiological environmental monitoring will continue under the FEMP site-wide Environmental Monitoring Program for the frequency specified in the *IEMP* [DOE, 1996b]. Data will be collected under that ongoing program during the implementation of the OSDF remedial action project from air monitoring stations located on the FEMP property, near the FEMP property fenceline, and off-property at several locations in nearby communities. That monitoring program has been developed in response to DOE Orders 5400.1 and 5400.5, and is currently presented in the *IEMP*. Therefore, the OSDF air monitoring program as presented herein will be compatible with and heavily reliant on the FEMP site-wide air monitoring scheme presented in the *IEMP*.

The Occupational Air Monitoring Program is outside the scope of this plan; however, it is discussed briefly herein. Occupational (including radiological safety) air monitoring program data, with their own compliance guidelines, are also tools to be used to provide verification that such engineering and administrative controls are effective in controlling emissions within predicted ranges and below their respective compliance guidelines.

1.2 PROJECT DESCRIPTION

The conceptual design of the OSDF was initially developed as an alternative in the *Feasibility Study for Operable Unit 2 (OU2 FS)* [DOE, 1995b] and was identified as the selected remedial alternative in the *Record of Decision for Remedial Actions at Operable Unit 2 (OU2 ROD)* [DOE, 1995a]. On-site disposal of impacted material is also the selected remedial alternative in the *Record of Decision for Remedial Actions at Operable Unit 5 (OU5 ROD)* [DOE, 1996a], and also the selected remedial alternative for certain impacted materials in the *Operable Unit 3 Record of Decision for Final Remedial Action (OU3 ROD)* [DOE, 1996c]. In addition, the material sent to the OSDF by OU3 may include contributions from OU1 and OU4.

The impacted material from the various areas of the FEMP will be required to meet OSDF waste acceptance criteria (WAC) prior to disposal in the OSDF. The estimated total volume of impacted material is 2.5 million cubic yards (1.9 million cubic meters) bank/unbulked. This volume estimate will be updated during the filling of the OSDF to account for swelling and bulking of the materials.

The construction, filling, and closure of the OSDF is currently anticipated to occur over a period of approximately 7 years, as described in the Accelerated Remediation Plan. However, due to the potential for variations in the pace of remedial action activities, the OSDF has been designed to be constructed, filled, and closed in phases.

Responses to comments received during a public comment period and public meeting were included in the Responsiveness Summary and became part of the *OU2 ROD* [DOE, 1995b] and the *OU5 ROD* [DOE, 1996a]. The *OU2 ROD* and the *OU5 ROD* and their respective Responsiveness Summaries require preparation of an air monitoring program to address, at a minimum, the following:

- monitoring of potential airborne particulate radionuclide emissions during construction, impacted material placement, and closure of the OSDF to verify compliance with established EPA and DOE radiation dose limits; and
- provide for collection of airborne particulate data in real-time, as appropriate, to verify effectiveness of engineering controls implemented during OSDF activities.

The OSDF air monitoring program presented in this document has been prepared to address these items and to satisfy the pertinent requirements identified in Section 2 of this plan.

1.3 PLAN SCOPE

The objective of this plan is to establish an environmental air monitoring program to evaluate potential public exposure due to the OSDF and its on-site borrow area during the construction, placement of impacted material into, and closure of the OSDF. The scope of this plan includes:

- identification of potential impacts to the public via the air pathway from OSDF remedial action project activities;
- basis for OSDF environmental air monitoring program;
- monitoring of potential OSDF airborne particulate emissions; and

- periodic review of the OSDF air monitoring program to evaluate its effectiveness in meeting the objectives.

1.4 PLAN ORGANIZATION

The remainder of this plan is organized as follows:

- requirements pertinent to this plan are presented in Section 2;
- the predicted potential airborne particulate emission constituents, potential impacts to the public health, and a discussion of the technical basis for the OSDF air monitoring program, are presented in Section 3;
- the OSDF air monitoring program is presented in Section 4;
- implementation of the OSDF air monitoring program is discussed in Section 5;
- data interpretation and actions to be taken based on data interpretation, periodic program review, and reporting of results are included in Section 6.

1.5 RESPONSIBILITIES

This plan describes work to be conducted by FERMCO. Responsibilities include: operation and maintenance of air monitoring equipment; reporting results of air monitoring to ensure that administrative and engineering controls are effective; provision of monitoring results and incorporation into annual 40 CFR Part 61 NESHAP Subpart H reporting and for other site environmental reporting; periodic evaluation of the air monitoring program, and revision as necessary.

1.6 RELATED PLANS

Several other remedial action implementation plans being prepared for the OSDF contain information relevant to this plan. These other plans are listed below along with a brief statement of the relationship of the plan to this plan.

- *OSDF Systems Plan.* Provides guidance on the activities related to the inspection and maintenance of the OSDF including the leachate management system, final cover system, seasonal cover system, temporary facilities, and temporary haul and access roads within the battery limits of the OSDF. Also includes engineering controls (such as reasonably available control measures as listed in OAC 3745-17-08(B)) to limit dust generation during these activities.

- *OSDF Impacted Materials Placement (IMP) Plan.* Describes procedures for acceptance and placement of impacted materials into the OSDF. The plan provides for engineering controls (such as reasonably available control measures as listed in OAC 3745-17-08(B)) to limit dust generation during materials placement.

- *OSDF Borrow Area Management and Restoration (BAMR) Plan.* Includes dust emission engineering controls (such as reasonably available control measures as listed in OAC 3745-17-08(B)) and management techniques during restoration of the soil borrow area of the OSDF.

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2. PERTINENT REQUIREMENTS

2.1 OVERVIEW

Regulatory and other requirements pertinent to this plan primarily take the form of applicable or relevant and appropriate requirements (ARARs) for the various FEMP operable units, functional requirements, and general design criteria.

2.2 ARARs AND TBCs

ARARs and to be considered criteria (TBCs) that should be addressed by this plan are provided here, as obtained from the *Final Record of Decision for Remedial Actions at Operable Unit 2 (OU2 ROD)* [DOE, 1995b], the *Final Record of Decision for Remedial Actions at Operable Unit 5 (OU5 ROD)* [DOE, 1996a], the *Operable Unit 3 Record of Decision for Final Remedial Action (OU3 ROD)* [DOE, 1996c] , or the *Permitting Plan and Substantive Requirements for the On-site Disposal Facility (OSDF Permitting Plan)* [DOE, 1996d], as identified. [NOTE: OU3 ROD & OSDF Permitting Plan columns, which are shaded, are to be completed after OU3 ROD signature]

	Citation	Requirement	OU2 ROD	OU5 ROD	OU3 ROD	OSDF Permitting Plan
1	Ohio General Provisions on Air Pollution Control OAC 3745-15-07 and ORC 3704.01-.05	Require that measures be taken to adopt and maintain a program for the prevention, control, and abatement of air pollution.	✓	✓		
2	National Primary and Secondary Ambient Air Quality Standards 40 CFR § 50	Establishes primary and secondary ambient air quality standards for total suspended particulates measured in the ambient air as particles with an aerodynamic diameter less than or equal to a nominal ten micrometers (PM_{10}).	✓	✓		

		Citation	Requirement	OU2 ROD	OU5 ROD	OU3 ROD	OSDF Permitting Plan
1	3	Ohio Particulate Matter Standards—Ambient Air Quality Standards OAC 3745-17-02	Establishes primary and secondary ambient air quality standards for total suspended particulates measured in the ambient air as particles with an aerodynamic diameter less than or equal to a nominal ten micrometers (PM_{10}).	✓	✓		
2	4	Ohio Particulate Matter Standards—Non-degradation Policy OAC 3745-17-05	Prohibits the significant and avoidable deterioration of air quality in any part of an area where ambient air quality is equal to or better than that required by OAC 3745-17-02.	✓	✓		
3	5	Ohio Particulate Matter Standards—Restriction of Emission of Fugitive Dust OAC 3745-17-08	Provides for the restriction of emissions of fugitive dust by the use of "reasonably available control measures" as listed therein at OAC 3745-17-08(B).	✓	✓		
4	6	Ohio Particulate Matter Standards—Restrictions on Particulate Emissions from Industrial Processes OAC 3745-17-11	Describes restrictions for particulates from any operation, process or activities (except those governed by OAC 3745-17-08) which release or may release particulate emissions into the ambient air.	✓			
5	7	Ohio Particulate Matter Standards—Control of Visible Particulate Emissions from Stationary Sources OAC 3745-17-07(B)(4)-(6)	Visible particulate emissions in any 60 minute observation period are not to exceed: • 6 minutes from paved roadways or parking areas • 13 minutes from unpaved roadways or parking areas • 13 minutes from any material storage piles.	✓	✓		

	Citation	Requirement	OU2 ROD	OU5 ROD	OU3 ROD	OSDF Permitting Plan
8	Ohio Standard for Active Asbestos Disposal Sites OAC 3745-20-06	Prohibits visible emissions of asbestos from asbestos-containing materials during and after placement.				
9	Ohio Asbestos Emission Control—Standard for Inactive Asbestos Waste Disposal Sites OAC 3745-20-07(A)&(C)	Prohibits visible emissions from asbestos-containing materials from an inactive asbestos waste disposal site.	✓			
10	Radiation Protection of the Public and the Environment DOE Order 5400.5 Chapter II(1)(a)	Exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an effective dose equivalent (EDE) greater than 100 millirem (mrem). Dose evaluations should reflect realistic exposure conditions. Specific authorization may be received for a temporary increase in the dose limit up to 500 mrem in a year.	✓	✓		
11	National Emissions Standards for Hazardous Air Pollutants (NESHAP), Subpart H—National Emissions Standard for Emission of Radionuclides Other than Radon form DOE Facilities 40 CFR §§ 61.92, 61.93 also Radiation Protection of the Public and the Environment DOE Order 5400.5, Chapter II(1)(b)	Emissions of radionuclides (except radon-220 and radon-222) to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an EDE of 10 mrem/year. To determine compliance with the standard, radionuclide emissions shall be determined and EDE values to the members of the public shall be calculated using EPA-approved sampling procedures, computer models CAP88 or AIRDOS-PC, or other procedures for which EPA has granted prior approval.	✓	✓		

		Citation	Requirement	OU2 ROD	OU5 ROD	OU3 ROD	OSDF Permitting Plan
1	12	National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart Q—National Emission Standard for Radon Emissions from DOE Facilities 40 CFR § 61.192	No source at a DOE facility shall emit into the air more than 20 pCi/m²s as an average for the entire source. Source is defined in the regulation as any building structure, pile, impoundment, or areas used for storage or disposal that contains sufficient quantities of radium to exceed the standard.	✓	✓		
2	13	Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, Subpart D—Control of Radon Emissions 40 CFR §192.32(b)(1)(ii) also Radiation Protection of the Public and the Environment DOE Order 5400.5, Chapter IV(6)(d)	Controls shall be designed to provide reasonable assurance that releases of radon-222 to the atmosphere will not: • exceed an annual release rate of 20 pCi/m²s • increase the annual average concentration of radon-222 in air or above any location outside the disposal site by more than 0.5 pCi/L.	✓	✓		
3	14	DOE Facilities Radiation Protection of the Public and Environment Draft 10 CFR 834	Incorporates provisions of DOE Order 5400.5		✓		
4	15	Radioactive Waste Management—Manageme nt of Low-Level Waste, Environmental Monitoring DOE Order 5820.2A Chapter III(3)(k)	Provides for environmental monitoring (including air monitoring) at low level waste treatment, storage, and disposal facilities	✓	✓		

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2.3 FUNCTIONAL REQUIREMENTS

The *OSDF Design Criteria Package (OSDF DCP)* [GeoSyntec, 1996] contains a variety of functional requirements that have been established for the OSDF. Functional requirements applicable to this plan are:

- the OSDF air monitoring program, in conjunction with the site-wide environmental air monitoring program, should provide reasonable assurance, via monitoring or other means such as calculations or modeling, that emissions to the public or the environment are within compliance guidelines;
- existing air monitoring station locations within the proposed limits of the OSDF will be abandoned in conformance with site specifications and relocated as necessary to maintain the overall monitoring of the FEMP;
- the OSDF air monitoring activities should be complimentary to other environmental monitoring programs implemented at the FEMP, and may be included within the existing site-wide environmental air monitoring program; and
- as low as reasonably achievable (ALARA) goals should apply to workers involved in air monitoring activities near the OSDF.

2.4 GENERAL DESIGN CRITERIA

The *OSDF DCP* [GeoSyntec, 1996] identifies a number of general design criteria for the OSDF. The general design criteria applicable to this plan are:

- the OSDF air monitoring stations will be located at the FEMP fenceline in order to assess the potential public exposure.

2.5 OTHER REQUIREMENTS

In addition to the requirements contained in the *OSDF DCP*, other guidelines which have been consulted in the formulation of this plan are:

- *DOE/EH-0173T* - Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance; and

- *Fernald Site Environmental Monitoring Plan (EMP)* [FERMCO, 1995a]; and

- *Integrated Environmental Monitoring Plan (IEMP)* [DOE, 1996b].

2.6 INTEGRATION OBJECTIVES AND PROGRAM BOUNDARIES

The FEMP site-wide air pathway has been historically evaluated under two closely-knit programs:

- The *Environmental Monitoring Plan (EMP)* [FERMCO, 1995a] program, which provided physical air monitoring at select on-property locations, the FEMP property boundary, and critical off-property locations of concern to public stakeholders; and

- The 40 CFR §61 NESHAPs Subpart H air pathway dose assessment program, which provided calculated estimates of the FEMP's radiological impacts beyond the FEMP property fenceline to comply with Clean Air Act provisions. Demonstration of compliance with this standard must be based on computer models approved by EPA, such as CAP88-PC.

The FEMP's NESHAPs air pathway dose assessment calculation generated by CAP88-PC is reported to EPA as a stand-alone report to satisfy the requirements of 40 CFR §61 NESHAPs Subpart H. That information is then reported in and used as an input to the annual site-wide dose assessment (which includes all media pathways) required for the FEMP's annual Site Environmental Report that historically satisfied DOE Order 5400.1 and 5400.5 environmental monitoring and total dose assessment obligations.

As the successor to the *EMP*, the *Integrated Environmental Monitoring Plan (IEMP)* [DOE, 1996b] will continue the responsibility of physically monitoring the air pathway and providing calculated dose assessments to satisfy the requirements of 40 CFR §61 NESHAPs Subpart H and the intentions of DOE Orders 5400.1 and 5400.5. As part of this responsibility, the *IEMP* monitoring results will be used to assess the computer modeling simulations conducted under NESHAPs to ensure that the emission rates used

in the modeling closely align with the categories of remedial activities underway at the FEMP. The *IEMP* establishes a reporting plan to combine the results of the air monitoring program and the NESHAPs dose assessments into a single reporting mechanism to facilitate regulatory agency review of the success of site-wide remediation activities and associated emission controls.

Like its predecessor, the *IEMP*, and the Integrated Environmental Monitoring Program, will undergo review every year, and mandatory revision every two years. In its first generation covering Fiscal Years 1997 and 1998, the initial focus of the *IEMP* is monitoring the FEMP site-wide effects of remediation activities contemplated for those fiscal years. The results will be evaluated periodically to provide necessary feedback to the remediation projects to ensure that cumulative site-wide impacts remain within established thresholds. Ultimately, this initial information will assist in tracking trends during FEMP remediation to help identify necessary changes in Integrated Environmental Monitoring Program emphasis or allow the scale back of monitoring activities as appropriate. It is anticipated that any such changes in the Integrated Environmental Monitoring Program will pass through to the remediation-project-specific air monitoring programs, as appropriate.

As is identified in the *IEMP*, the programmatic boundary for the *IEMP*'s air monitoring program is the site-wide air monitoring to be conducted at the FEMP property fenceline and beyond. Project-specific emission control monitoring is the responsibility of the individual remediation projects. However, as may be indicated in the individual design documents and/or remedial action planning documents submitted by the remediation projects, those projects that are physically located adjacent to or near the FEMP property fenceline may incorporate some or all of the air monitoring conducted under the Integrated Environmental Monitoring Program into their emission control programs, if appropriate. The emission source terms represented by the projects will also be used (as appropriate) in the CAP88-PC air modeling reported through the *IEMP* to calculate air pathway dose assessments in accordance with the 40 CFR NESHAPs Subpart H regulatory driver as discussed above.

The OSDF air monitoring program as presented in this OSDF Air Monitoring Plan has been formulated in accordance with this integrated strategy.

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3. PREDICTED EMISSIONS AND POTENTIAL HEALTH IMPACTS

3.1 OVERVIEW

Emissions of particulate matter to the ambient air may result during construction, impacted materials placement, and closure activities at the OSDF, from such sources as:

- movement of clean soil during construction of the OSDF liner system;
- placement into the OSDF of impacted soil, building demolition debris, concrete, and other remediation waste materials;
- movement of clean soil during construction of the OSDF cover system;
- vehicle movement; and
- wind erosion of soil surfaces.

Airborne particulate emissions from the OSDF were covered in the air pathway portion of the short-term risk assessment presented in the *Feasibility Study Report for Operable Unit 5 (OU5 FS)* [DOE, 1995c]. The potential risks associated with predicted airborne emissions from the OSDF are discussed briefly in this section and were used to formulate the OSDF environmental air monitoring program.

The *OU5 FS* [DOE, 1995c] includes modeling for activities during OSDF construction and impacted materials placement to support the short-term risk assessment. The short-term risk assessment, presented in the Appendix G of the *OU5 FS*, utilized air pathway modeling to predict potential airborne emissions. Models used in the conducting the short-term risk assessment are presented in Section G.I.0 therein.

For the discussions contained in this section and throughout the remainder of this plan, it is important to note the following two points:

1. In the *OU5 FS*, and hence in the discussions herein, the near off-property public is defined as a hypothetical receptor located immediately adjacent to the FEMP property boundary at the fence line for the entire duration of the FEMP cleanup process. The projected risk or dose to a near-property receptor located at any other position, or for any shorter duration, would be expected to be less than these projections.

2. The potential for particulate emissions during such activities will be mitigated by various engineering controls ("reasonably available control measures" as listed in OAC 3745-17-08(B)) such as dust suppression (*i.e.*, application of water to exposed soil surfaces), and administrative controls such as placement of impacted materials in the OSDF only when wind speeds are less than certain levels, which will further reduce the potential for emissions, and hence the predicted concentrations, risks, and doses discussed herein.

Based on the *OU5 FS* short-term risk assessment results [DOE, 1995c], several trends for potential impacts on human health were identified:

- Chemical carcinogens will not be important factors during soil remediation at the FEMP.

- Inhalation of radionuclides from dust (airborne particulates) impart the greatest potential risk, followed by potential exposure to direct radiation.

- Only the on-property remediation workers could potentially incur risks exceeding 1 in 1,000,000 (1×10^{-6}) and no greater than 9.4 in 10,000 (9.4×10^{-4}). This indicates these remediation workers should be subject to occupational medical monitoring in accordance with the site's health and safety program.

- The potential risk to public health due to OSDF construction and impacted materials placement is low — lower than 1 in 1,000,000 (1×10^{-6}) and no greater than 4 in 10,000,000 (4×10^{-7}).

- The air exposure pathway is potentially greatest through inhalation of particulate emissions containing radionuclides; however, radionuclides in airborne particulate emissions potentially emanating from the OSDF are predicted to result in a dose to the public approximately 20 times less than applicable EPA and DOE airborne standards.

Environmental air monitoring for airborne particulate emissions and radionuclides from the OSDF, as addressed by the OSDF environmental air monitoring program, will be performed to provide verification that such engineering and administrative controls are

effective in controlling emissions, and that airborne emissions are within predicted ranges and below compliance guidelines.

3.2 PREDICTED AIRBORNE PARTICULATE EMISSIONS AND POTENTIAL HEALTH IMPACTS

Airborne particulate emissions from the OSDF were covered in the air pathway portion of the short-term risk assessment presented in Appendix G of the *OU5 FS* [DOE, 1995c] as discussed above. The potential risks associated with airborne emissions at the OSDF are discussed in the paragraphs below and were used to formulate the OSDF environmental air monitoring program.

Data from air dispersion modeling for impacted material placement in the OSDF is presented in the air pathway portion of the short-term risk assessment in Appendix G of the *OU5 FS* [DOE, 1995c]. This data predicts, for radionuclides and nonradionuclides (*i.e.*, metals and other organic compounds) the airborne concentrations that the near off-property public might be exposed to.

In Appendix G of the *OU5 FS*, and hence in the discussions herein, near off-property public is defined as a hypothetical receptor located immediately adjacent to the FEMP property boundary at the fence line for the entire duration of the FEMP cleanup process. The projected risk to a near-property receptor located at any other position, or for any shorter duration, would be expected to be less than these projections. Additionally, the application of reasonably available control measures (as listed in OAC 3745-17-08(B)) to reduce emissions of fugitive dust would reduce these projected concentrations and risks.

The predicted potential concentrations of nonradionuclides are extremely low, ranging from 9.3×10^{-16} mg/m^3 (bischloromethyl ether) to 8.3×10^{-10} mg/m^3 (total uranium metal). The *OU5 FS* short-term risk assessment, when considering the impacts that remediation actions may have on human health, states that:

> *"the inhalation of chemical toxicants will not be an important contribution to human health impact in this remediation, except for the on-site remediation workers".*

Based on this conclusion and because the predicted air concentrations for metals and organic compounds as described above are extremely low, nonradionuclides will not be included in the OSDF environmental air monitoring program.

The predicted potential concentrations (expressed as activity) of radionuclides are also low, ranging from 7.2 x 10^{-9} pCi/m^3 (Uranium-234) as the lowest to 1.3 x 10^{-4} pCi/m^3 as the highest (Thorium-230 and Uranium-238). The *OU5 FS* short-term risk assessment also states:

> *"Inhalation of radionuclides imparts the greatest portion of the carcinogenic risks ... only the on-property remedial workers would incur risks exceeding 10^{-6}".*

3.3 COMPARISON TO COMPLIANCE GUIDELINES

The *Fernald Site Environmental Monitoring Plan (EMP)* [FERMCO, 1995a] summarized limits and guidelines set by DOE and EPA regarding radiological airborne emissions as follows:

(a) DOE Order 5400.5 Chapter II(1)(a) — The exposure of members of the public to radiation sources as a consequence of all routine activities at a DOE site shall not cause an effective dose equivalent (EDE) greater than 100 mrem in a year.

(b) United States Environmental Protection Agency, 40 CFR 61 Subpart H, and DOE Order 5400.5 Chapter II(1)(b) — The exposure of members of the public to radionuclides (except Radon-220 and Radon-222) released to the atmosphere as a consequence of all routine activities at a DOE site shall not cause an EDE greater than 10 mrem in a year.

(c) United States Environmental Protection Agency, 40 CFR 61 Subpart H — Radionuclide *point sources* with the potential to deliver an EDE of 0.1 mrem/year or greater to any member of the public require continuous air monitoring.

To predict compliance with these criteria, guidelines, referred to as Derived Concentration Guidelines (DCGs), can be utilized. DCGs (established in DOE Order

5400.5) are concentrations of individual radionuclides that, under conditions of continuous exposure for one year by one exposure mode to one radionuclide, would result in an EDE of 100 mrem in one year; for known mixtures of radionuclides, the sum of the ratios of the observed concentration of each radionuclide to its corresponding DCG must not exceed 1.0. These DCGs can be used as comparison criteria to evaluate radionuclide data to assess the potential to exceed the limits on dose to members of the public from activities occurring at the OSDF.

By using the predicted radionuclide concentrations from the short-term risk assessment, calculating the ratios using corresponding DCGs, and comparing the sum of the ratios, compliance with the respective criteria can be assessed by using the comparison thresholds presented in Table 3-1.

Table 3-1
COMPARISON THRESHOLDS

	Criteria	EDE threshold (mrem/year)	Comparison threshold = EDE threshold/DCG threshold
(a)	DOE Order 5400.5 Chapter II(1)(a) all pathways	100	100/100 = 1.0
(b)	40 CFR Part 61 Subpart H, and DOE Order 5400.5 Chapter II(1)(b) air pathway	10	10/100 = 0.1
(c)	40 CFR Part 61 Subpart H point source monitoring	0.1	0.1/100 = 0.001

Table 3-2 presents a comparison of the predicted radionuclide air concentrations from the *OU5 FS* short-term risk assessment to the DCGs. Important conclusions drawn from this evaluation are:

- When compared to the DCG — which corresponds to an airborne dose of 100 mrem/year — none of the predicted radionuclide concentrations exceeds its corresponding DCG; none exceed 1/10th (1×10^{-1}, or 10 percent) or even 1/100th (1×10^{-2}, or 1 percent) of

Table 3-2
EVALUATION OF PREDICTED AIRBORNE PARTICULATE RADIONUCLIDE CONCENTRATIONS

Line	1 Radionuclide	2 Specific Activity, pCi/ug	3 DCG[1, 2], pCi/m³	4a Predicted Conc., ug/m³	4b Rank	4c Percent of Sum	5a Predicted Activity[3], pCi/m³	5b Rank	5c Percent of Sum	6a Ratio of Predicted Activity to DCG	6b Rank	6c Percent of Sum	6d Cumu-lative Percent of Sum
1	Thorium-230	1.9×10^{4}	4.0×10^{-2}	6.8×10^{-9}	4	0.00	1.3×10^{-4}	1	42.60	3.2×10^{-3}	1	58.04	58.04
2	Uranium-238	3.3×10^{-1}	1.0×10^{-1}	3.9×10^{-4}	1	86.59	1.3×10^{-4}	1	42.60	1.3×10^{-3}	2	23.22	81.26
3	Thorium-232	1.1×10^{-1}	7.0×10^{-3}	6.0×10^{-5}	2	13.31	6.6×10^{-6}	5	2.16	9.4×10^{-4}	3	16.84	98.10
4	Radium-226	9.9×10^{5}	1.0×10^{0}	2.3×10^{-11}	8	0.00	2.3×10^{-5}	3	7.54	2.3×10^{-5}	4	0.41	98.51
5	Neptunium-237	7.1×10^{2}	2.0×10^{-2}	5.1×10^{-10}	6	0.00	3.6×10^{-7}	12	0.12	1.8×10^{-5}	5	0.32	98.83
6	Thorium-228	8.2×10^{8}	4.0×10^{-2}	8.7×10^{-16}	15	0.00	7.1×10^{-7}	10	0.23	1.8×10^{-5}	5	0.32	99.15
7	Plutonium-239/240	6.1×10^{4}	2.0×10^{-2}	5.4×10^{-12}	9	0.00	3.3×10^{-7}	13	0.11	1.7×10^{-5}	7	0.29	99.44
8	Uranium-236	4.4×10^{2}	1.0×10^{-1}	2.5×10^{-9}	5	0.00	1.1×10^{-6}	7	0.36	1.1×10^{-5}	8	0.20	99.64
9	Plutonium-238	1.7×10^{7}	3.0×10^{-2}	1.8×10^{-14}	10	0.00	3.1×10^{-7}	14	0.10	1.0×10^{-5}	9	0.18	99.83
10	Uranium-235	2.1×10^{0}	1.0×10^{-1}	4.4×10^{-7}	3	0.10	9.4×10^{-7}	9	0.31	9.4×10^{-6}	10	0.17	99.99
11	Radium-228	2.3×10^{8}	3.0×10^{0}	2.3×10^{-15}	13	0.00	5.3×10^{-7}	11	0.17	1.8×10^{-7}	11	0.00	100.00
12	Strontium-90	1.4×10^{8}	9.0×10^{0}	7.0×10^{-15}	12	0.00	9.8×10^{-7}	8	0.32	1.1×10^{-7}	12	0.00	100.00
13	Uranium-234	6.2×10^{5}	9.0×10^{-2}	1.2×10^{-14}	11	0.00	7.2×10^{-9}	16	0.00	8.0×10^{-8}	13	0.00	100.00
14	Thorium-234	2.3×10^{10}	5.0×10^{2}	3.4×10^{-16}	16	0.00	7.9×10^{-6}	4	2.59	1.6×10^{-8}	14	0.00	100.00
15	Technetium-99	1.7×10^{4}	2.0×10^{3}	1.3×10^{-10}	7	0.00	2.2×10^{-6}	6	0.72	1.1×10^{-9}	15	0.00	100.00
16	Cesium-137	8.7×10^{7}	4.0×10^{2}	2.2×10^{-15}	14	0.00	1.9×10^{-7}	15	0.06	4.8×10^{-10}	16	0.00	100.00
SUM:				4.5×10^{-4}	=	0.00045	3.1×10^{-4}	=	0.00031	5.6×10^{-3}	=	0.0056	
									DOSE:	0.56 mrem/year			

NOTES:
(1) Source: Derived Concentration Guidelines (DCGs) for Concentrations of Radionuclides in Air Emissions; Radiation Protection of the Public and the Environment, DOE Order 5400.5.
(2) DCG concentrations in DOE Order 5400.5 have been converted to pCi/m³. Source: Tables 5-4 and 5-5: Measured Radionuclides at AMS 9/9A and AMS 8, *Fernald Site Environmental Monitoring Plan* [FERMCO, 1995a].
(3) Source: Table G.I-23: Exposure Air Concentrations in the Vicinity of the Hypothetical Near-Property Public Receptor; Short-Term Risk Assessment; *Feasibility Study Report for Operable Unit 5* [DOE, 1995c].

its DCG; only two (Thorium-230 and Uranium-238) exceed 1/1,000th (1×10^{-3}, or 0.1 percent) of their respective DCGs; while a third (Thorium-232) exceeds 1/10,000th (1×10^{-4}, or 0.01 percent) of its DCG.

- When compared to a level of 0.1 DCG — which corresponds to an airborne dose of 10 mrem/year — none of the predicted radionuclide concentrations exceeds its corresponding level; none even exceed 1/10th (1×10^{-1}, or 10 percent) of this level; only two (Thorium-230 and Uranium-238) exceed 1/100th (1×10^{-2}, or 1 percent) of this level; while a third (Thorium-232) exceeds 1/1,000th (1×10^{-3}, or 0.1 percent) of this level.

- The sum of the ratios of the individual radionuclide concentrations to its corresponding DCG equals 5.6×10^{-3} (0.0056), far below the DOE Order 5400.5 Chapter II(1)(a) threshold of 1.0. and the EPA's 40 CFR Part 61 Subpart H and DOE Order 5400.5 Chapter II(1)(b) threshold of 0.1.

- The airborne radionuclide concentrations predicted from OSDF activities result in a dose to the off-property public of 0.56 mrem/year, which is

  - *approximately 200 times lower* than the DOE Order 5400.5 Chapter II(1)(a) dose limit of 100 mrem/year, and

  - *approximately 20 times lower* than the EPA's 40 CFR Part 61 Subpart H and DOE Order 5400.5 Chapter II(1)(b) airborne dose limit of 10 mrem/year.

The EPA threshold of 0.1 mrem/year for determining if a *point source* requires continuous monitoring would be exceeded by over a factor of five; however, no thresholds exist for area sources. By their nature as stacks or vents, point sources are readily amenable to emissions monitoring. In contrast, area sources produce diffuse emissions which are not readily amenable to emissions monitoring. Rather, area sources are amenable to monitoring downwind at the point of potential public exposure. The OSDF is an *area source*, not a point source. Therefore, the OSDF has been evaluated for the magnitude and nature of its potential emissions. In turn, these are used to evaluate or formulate a monitoring regimen downwind of the OSDF at the point of potential public exposure.

It should be noted that these concentrations, and hence conclusions, are based on a hypothetical receptor located immediately adjacent to the FEMP property boundary at the fence line for the entire duration of the FEMP cleanup process. The projected risk and dose to a near-property receptor located at any other position or for any shorter duration would be expected to be less than these projections. Additionally, the application of reasonably available control measures (as listed in OAC 3745-17-08(B)) to reduce emissions of fugitive dust would reduce these projected concentrations, risks, and doses.

4. OSDF AIR MONITORING PROGRAM

This section first presents information on the FEMP site-wide air monitoring program and its monitoring networks. Direct radiation and radon are presented, followed by airborne particulate radionuclides, indicated in Section 3 as the primary concern for OSDF remediation activities. With that introduction, this section then presents information on the OSDF air monitoring program.

4.1 SITE-WIDE AIR PATHWAY MONITORING SUMMARY

The following information from the *IEMP* [DOE, 1996b] is presented for understanding of the FEMP site-wide air pathway monitoring program, as it relates to information presented below in Section 4.2.

4.1.1 METEOROLOGICAL MONITORING DESIGN SUMMARY

The following information is presented for understanding of the FEMP site-wide meteorological monitoring program, as it relates to information presented below in Section 4.1.2 and in Section 6.3.

Although not a distinct component of the site-wide environmental air monitoring program, the meteorological monitoring program is designed to provide data on the atmospheric conditions which influence the dispersion and transport of contaminants in the air pathway. This program provides critical data in support of the design and conduct of FEMP air monitoring programs, and as such is presented in herein.

The FEMP meteorological monitoring system consists of a single 60-meter tall meteorological tower located west of the Storm Water Retention Basin, as illustrated in Figure 4-1 herein, reproduced from the *IEMP* [DOE, 1996b]. Monitoring instruments record wind speed and direction, temperature, barometric pressure, precipitation and relative humidity, and store 1-minute and 15-minute average data on the meteorological data base. The system has been developed to meet the requirements of DOE Order 5400.5 and DOE guidance [DOE, 1991], and complies with industry standards for calibration and data recovery. Meteorological data is used in the evaluation and interpretation of environmental data collected from air, radon, and

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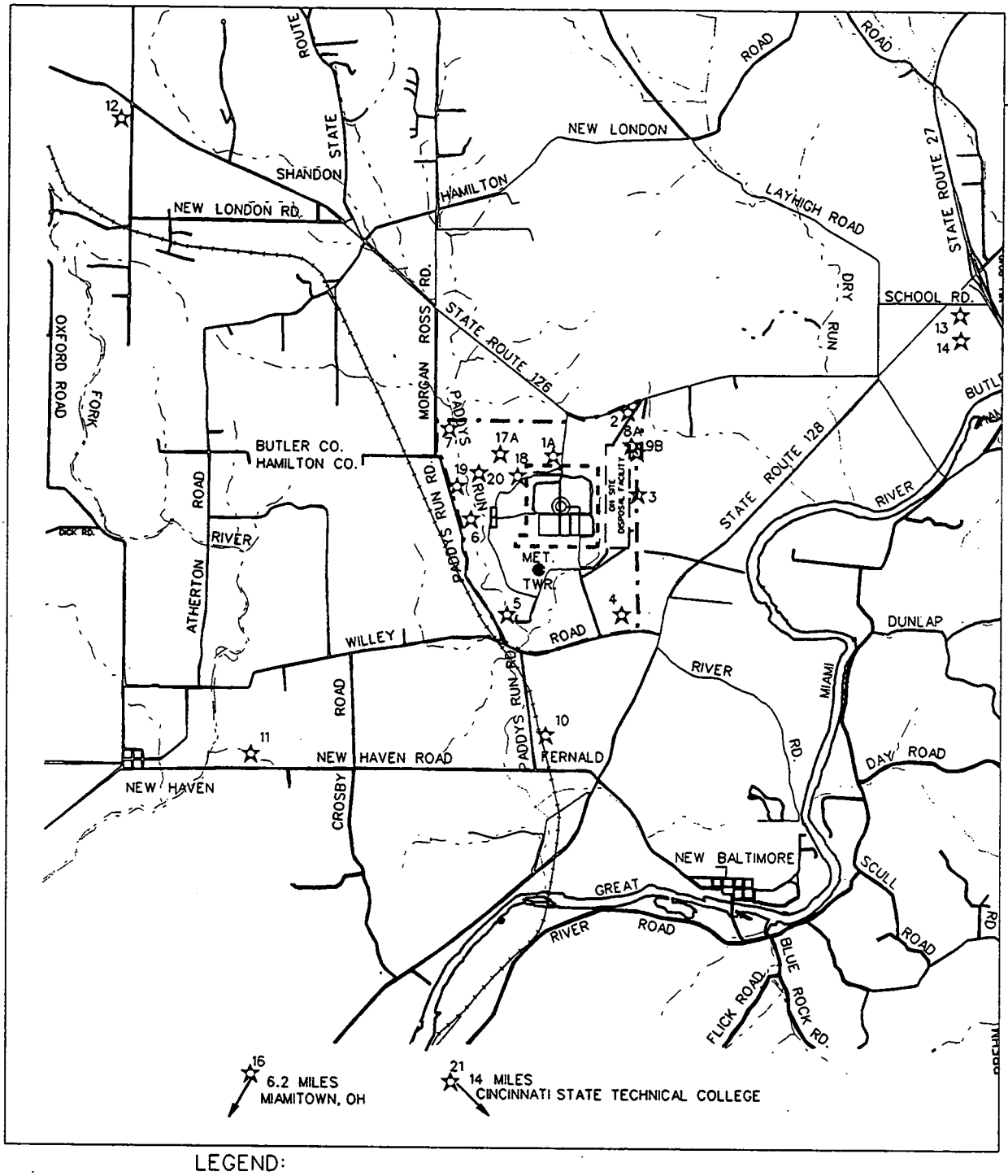


LEGEND:

- DISTANCE FROM CENTER OF PRODUCTION AREA TO SAMPLING LOCATIONS OFF MAP
- AIR MONITORING LOCATION
- METEOROLOGICAL TOWER (MET. TWR.)
- FEMP BOUNDARY
- PRODUCTION AREA BOUNDARY

SCALE

1 ½ 0 1 MILE

DRAFT

FIGURE 4-1. AIR MONITORING LOCATIONS

000033

project-specific monitoring data. The data also supplies one of the inputs to CAP88-PC used in the NESHAPs Subpart H compliance demonstration. Meteorological data is also used to support day to day operations for construction, emergency preparedness, and engineering design.

4.1.2 PREVAILING WIND

Dispersion and transport of airborne pollutants is subject to whatever weather conditions exist. Weather data, particularly windspeed and direction, provide guidance in collecting environmental samples and determining sites for monitoring stations.

Figures 4 and 5 of the *1994 Site Environmental Report* [FERMCO, 1995b] present annual wind roses which illustrate the average wind speed and general direction measured at the 10-meter (33-foot) height and 60-meter (197-foot) levels in 1994. At the 10-meter height, the prevailing winds were from the southwest (11%) and from the west (10%); at the 60-meter height, prevailing winds were from the south-southwest (13%) and from the northeast (10%). Additionally, Drawing X-3 *Facility Plot Plan* presents a wind rose at the 10-meter (33-foot) height for combined 1994-1995 data. The prevailing winds were from the southwest to west (the southwest quadrant) for the two-year period, demonstrating no major variability from the 1994 data. In summary, under prevailing wind conditions, downwind is northeast to east (the northeast quadrant).

In previous years, trees growing near the meteorological tower affected the measured wind speeds at the 10-meter (33-foot) level because they acted as a wind barrier. In November 1993, trees within a 107-meter (351-foot) radius were cut down. As a result, the winds measured through 1994 and 1995 appear to be much more representative of the winds which cross the site and general area [FERMCO, 1995b].

4.1.3 DIRECT RADIATION MONITORING DESIGN SUMMARY

The following information is presented for understanding of the site-wide direct radiation monitoring program, as it relates to information presented in Section 4.2.1.

The FEMP site-wide direct radiation monitoring component of the *IEMP* monitoring program is designed to collect measurements of environmental radiation levels resulting from gamma-emitting radioactive materials on-property (primarily Radium-226, Thorium-232, and their decay products). This is accomplished using a network of 30 environmental thermoluminescent dosimeters (TLDs) at select locations on property, at the FEMP property fenceline, and off-property in the surrounding community (see Figure 4-2 herein, reproduced from the *IEMP*). DOE guidance [DOE, 1991] and American National Standards Institute [ANSI, 1975] specifications for environmental applications were considered in selecting monitoring locations. The primary siting criteria are the same as for the airborne particulate monitoring, excluding utilities location and wind direction.

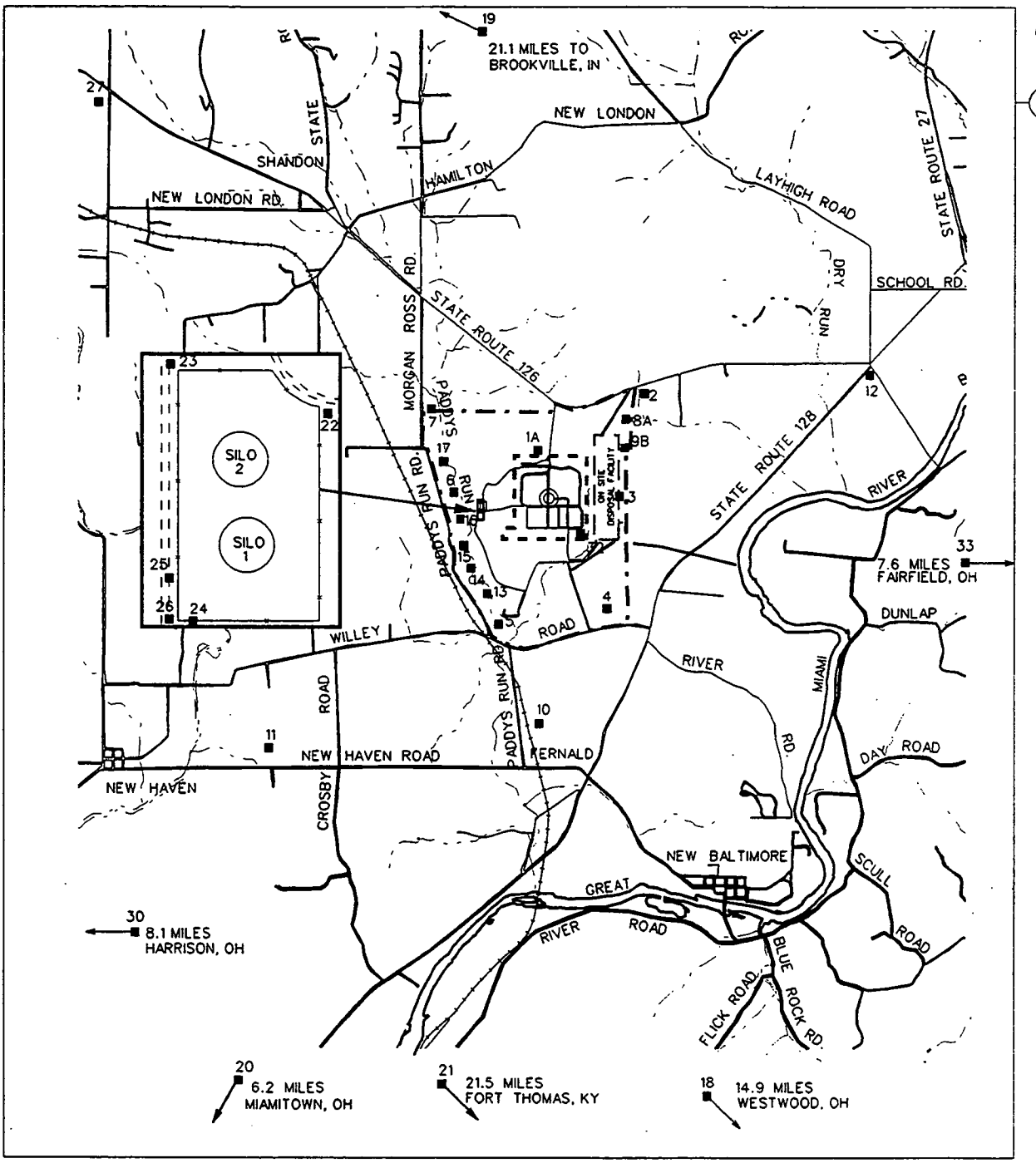
Three individual TLDs are placed at each location in order to assess the precision of the measurement data. The TLDs are placed at one meter above the ground and exchanged quarterly in accordance with industry standards and DOE guidance.

Data quality objectives (DQOs), analytical support level (ASL), sampling procedures, and quality assurance requirements for direct radiation monitoring are addressed in Section 6.0 of the *IEMP*.

4.1.4 RADON MONITORING DESIGN SUMMARY

The following information from the *IEMP* [DOE, 1996b] is presented for understanding of the site-wide radon monitoring program, as it relates to information presented in Section 4.2.2.

The FEMP site-wide radon monitoring component of the *IEMP* air monitoring program is designed to collect measurements of environmental radon concentrations at select locations on property, at the FEMP property fenceline, and off-property in the surrounding community. The monitoring design incorporates overlapping networks of alpha track-etch radon cups and alpha scintillation continuous radon monitors (see Figure 4-3 herein, reproduced from the *IEMP*). The use of long-term integrating alpha track-etch detectors produces data used for assessing compliance with the annual limits contained in DOE Order 5400.5. The alpha track-etch detectors do not require electrical power and hence these detectors can be placed in any needed location. The



LEGEND:

- DISTANCE FROM CENTER OF PRODUCTION AREA TO SAMPLING LOCATIONS OFF MAP
- TLD MONITORING LOCATION
- FEMP BOUNDARY
- PRODUCTION AREA BOUNDARY

DRAFT

SCALE

1 ½ 0 1 MILE

FIGURE 4-2. TLD MONITORING LOCATIONS

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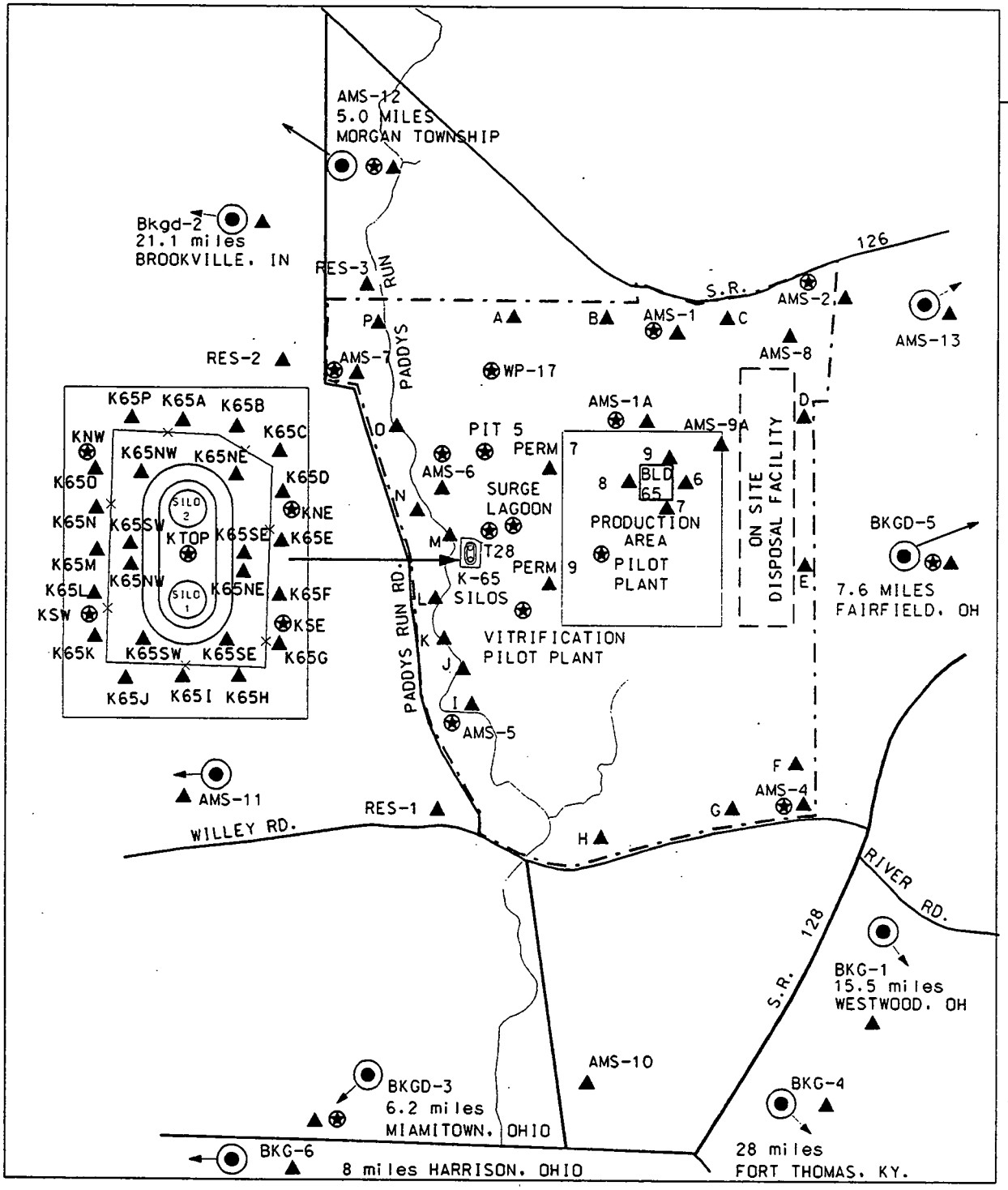

LEGEND:

- FEMP BOUNDARY
- CONTINUOUS RADON MONITORING LOCATION
- TRACK-ETCH MONITORING LOCATION
- DISTANCE FROM CENTER OF PRODUCTION AREA TO LOCATION OFF THE MAP

DRAFT

NOT TO SCALE

FIGURE 4-3. RADON MONITORING LOCATIONS

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alpha scintillation continuous radon monitors produce data that are used to assess compliance with the instantaneous radon concentration requirement of DOE Order 5400.5. These monitors are placed near a variety of sources. In addition, the *Federal Facilities Agreement for the Care and Abatement of Radon Emissions (FFA-CARE)* requires monitoring at nine locations both on- and off-property. These alpha scintillation continuous radon monitors require electrical power to operate; consequently, placement of these monitors is more constrained and related to the availability of electrical power. The monitoring locations reflect DOE guidance [DOE, 1991] for locating environmental monitors. The siting criteria are consistent with those considered for airborne particulate monitoring.

Multiple detectors are located at each alpha track-etch monitoring location in order to assess the precision of the monitoring data in accordance with industry recommendations. The alpha track-etch cups are placed at a height of one to two meters above the ground (*i.e.*, attached to a fencepost) and exchanged semi-annually to provide sufficient exposure time given the low ambient radon concentrations and the analytical limits of detection.

DQOs, ASLs, sampling procedures, and quality assurance requirements for radon monitoring are addressed in Section 6.0 of the *IEMP*.

4.1.5 Airborne Particulate Monitoring Design Summary

The following information from the *IEMP* [DOE, 1996b] is presented for understanding of the FEMP site-wide airborne particulate monitoring program, as it relates to information presented in Section 4.2.3.

The FEMP site-wide airborne particulate radiological monitoring component of the *IEMP* air monitoring program is designed to collect data that is representative of ambient air conditions at select locations on property, at the FEMP property fenceline, and off-property in the surrounding community. The monitoring approach utilizes a network of 20 high-volume air monitoring stations (AMSs) sited to address the following:

- Prevailing wind directions
- Location of source areas
- Sensitive receptor locations
- Location of physical obstructions
- Topography
- Available utilities

DOE guidance [DOE, 1991], the Waite Methodology [Waite, 1973], and EPA siting criteria [40 CFR §58, Appendix E] were considered in selecting the locations for those monitoring stations. The Waite Methodology is an analytical method for distributing air sampling locations around nuclear facilities. It incorporates a weighting factor based on demographics and meteorological data. The existing AMS network is illustrated in Figure 4-1 herein, reproduced from the *IEMP* [DOE, 1996b].

The monitoring stations located at the FEMP property fenceline encircle the Fernald site providing site-wide coverage for all potential point sources and area sources located on the FEMP property. The off-property community based monitors provide data at sensitive receptor locations such as local schools and businesses as well as providing background data. Background locations (AMS 21 and AMS 15) are located outside the influence of FEMP emissions.

The high-volume air monitors located at the FEMP property fenceline and off-property in the community are designed to collect a representative sample by establishing a continuous air flow of 1 m^3/min through a >0.5 micron filter. The intake of the air monitor is placed at two meters above the ground in accordance with EPA siting criteria. The air monitors are designed to sample a large volume of air (for analytical detection purposes) that is representative of air breathed by a hypothetical receptor.

All air filters from the high-volume air samplers are changed on a bi-weekly schedule. This provides a sufficient air volume passing through the filter to generate detectable levels of target analytes. The analytical regime for the bi-weekly samples includes total suspended particulates and airborne particulate total uranium analyzed at the on-site laboratory, and an annual composite (for each monitor) prepared from the bi-weekly samples analyzed at an off-site laboratory for a suite of site-specific radionuclides. Total uranium was selected for routine analysis because it represents the most pervasive contaminant on site and can be readily analyzed at the on-site laboratory providing quick turn-around time. The airborne particulate total uranium data is used as an

indicator to track the cumulative emissions at the FEMP property boundary/fenceline. The total suspended particulate data is used to confirm compliance with ambient air quality standards. This information is provided to the remediation projects to assess the effectiveness of project-specific emissions controls. The data from the annual composite airborne particulate radionuclide analysis is used to independently appraise the calculated air pathway dose assessments produced by the NESHAPs Subpart H CAP88-PC fate and transport modeling.

Table 4-1 summarizes the analytical regimen for airborne particulate samples. The airborne particulate annual composite radionuclide analyte suite was developed to represent the full range of radiological materials stored and processed at the FEMP, including principle decay products.

DQOs, ASLs, sampling procedures, and quality assurance requirements for airborne particulate monitoring are addressed in Section 6.0 of the *IEMP*.

Table 4-1
ANALYTICAL SUMMARY FOR AIRBORNE PARTICULATE SAMPLES(1)

Analysis Frequency	Analyte(s)	Detection Level
Biweekly	Total Suspended Particulates	N/A
Biweekly	Total Uranium	2 ug/filter
Annual composite	Uranium-234	7.0×10^{-6} pCi/m^3
	Uranium-235/236	7.0×10^{-6} pCi/m^3
	Uranium-238	7.0×10^{-6} pCi/m^3
	Thorium-228	2.3×10^{-6} pCi/m^3
	Thorium-230	2.3×10^{-6} pCi/m^3
	Thorium-232	2.3×10^{-6} pCi/m^3
	Plutonium-238	0.7×10^{-6} pCi/m^3
	Plutonium-239/240	0.7×10^{-6} pCi/m^3
	Radium-226	0.8×10^{-6} pCi/m^3
	Radium-228	8.0×10^{-6} pCi/m^3
	Strontium-90	0.7×10^{-6} pCi/m^3
	Cesium-137	1.1×10^{-5} pCi/m^3
	Technetium-99	7.4×10^{-5} pCi/m^3

Note:

(1) All entries in this table are informational only (*i.e.*, governed by the *IEMP* and its subsequent revisions). Source: Table 6-2, Analytical Summary for Radiological Air Particulate Samples, *Integrated Environmental Monitoring Plan (IEMP)* [DOE, 1996b].

4.2 OSDF AIR MONITORING PROGRAM

The OSDF design calls for eight disposal cells (plus a possible ninth contingency cell) which will be progressively constructed from north to south and filled with impacted materials as those materials are generated by remediation activities at the site. The OSDF is being constructed near the eastern FEMP property boundary. The borrow area will be constructed near the south-eastern FEMP property boundary.

4.2.1 DIRECT RADIATION MONITORING

Environmental direct radiation monitoring locations exist under the *IEMP* on the FEMP property boundaries and at off-property locations as presented in Figure 4-3 herein, reproduced from the *IEMP* [DOE, 1996b]. The existing environmental direct radiation monitoring station at AMS 2 is located northeast of the OSDF location along the FEMP northeastern property boundary; those at AMSs 8A, 9B and 3 are located along the FEMP eastern property boundary east of the location of the OSDF; that at AMS 4 is located southeast of the OSDF along the FEMP southeastern property boundary. These locations provide coverage closest to potential public exposure points. The existing environmental direct radiation monitoring network is thus properly situated in relation to the OSDF in order to monitor potential public exposure to direct radiation. The OSDF air monitoring program will utilize the *IEMP*'s direct radiation monitoring component.

4.2.2 RADON MONITORING

Environmental radon monitoring locations exist under the *IEMP* on the FEMP property boundaries and at off-property locations as presented in Figure 4-2 herein, reproduced from the *IEMP* [DOE, 1996b]. Existing radon monitoring stations D and E, and ones at AMSs 8A and 9B, are located along the FEMP eastern property boundary, east of the location of the OSDF; existing environmental radon monitoring locations F and G, and one at AMS 4, are located along the FEMP southeastern property boundary. Environmental radon monitoring locations D and E and at AMSs 2, 8A and 9B are positioned downwind from the OSDF under prevailing wind conditions. Existing environmental radon monitoring locations C and at AMS 2 to the north of the OSDF,

and F, G and at AMS 4 to the south of the OSDF, provide coverage closest to potential public exposure points. The existing environmental radon monitoring network is thus properly situated in relation to the OSDF in order to monitor potential public exposure to radon. The OSDF air monitoring program will utilize the *IEMP*'s radon monitoring component.

4.2.3 AIRBORNE PARTICULATE MONITORING

AMSs exist under the *IEMP* on the FEMP property boundaries and at off-property locations as presented in Figure 4-1 herein, reproduced from the *IEMP*. Existing AMS 2 is located along the FEMP's northeastern property boundary, northeast of the location of the OSDF; existing AMSs 3, 8A and 9B are located along the FEMP eastern property boundary, east of the location of the OSDF; and existing AMS 4 is located along the southeastern property boundary. AMSs 2, 3, 8A and 9B are positioned downwind from the OSDF under prevailing wind conditions; AMSs 2 and 4 provide coverage closest to potential public exposure points. The existing AMS network is thus properly situated in relation to the OSDF in order to monitor potential public exposure to airborne particulate radionuclides. The OSDF air monitoring program will utilize the *IEMP*'s airborne particulate radionuclide monitoring component.

Because the OSDF environmental air monitoring program data collected during activities at the OSDF will be used as part of the environmental surveillance effort under the *IEMP*, it is imperative that monitoring equipment, operating procedures, and analytical methods be compatible to those used in the *IEMP*. The following paragraphs present a brief evaluation of the site-wide airborne particulate analytical regime based upon predicted potential emissions from the OSDF during its construction, filling, and closure.

Table 3-2 presents airborne particulate radionuclide concentrations predicted to result from OSDF remedial action project activities, and illustrates:

(a) in column #4b, descending rank order of the radionuclides based upon predicted airborne concentrations expressed on a mass-basis (ug/m^3);

(b) in column #5b, descending rank order of the radionuclides based upon predicted airborne concentrations expressed on an activity-basis (pCi/m^3);

(c) in column #6b, and the basis for the presentation sequence in the table, descending rank order of the radionuclides based upon ratios of predicted airborne activity to Derived Concentration Guideline (DCG);

(d) in column #6c, percentage contribution of each radionuclide to the predicted total dose; and

(e) in column #6d, cumulative percentage contribution of each radionuclide to the predicted total dose.

Two radionuclide isotopes —Neptunium-237 (line # 5) and Thorium-234 (line # 14)— are presented in Table 3-2 but are omitted from Table 4-1 which illustrates the airborne particulate radionuclide analysis regimen for the OSDF air monitoring program. It is important to note that Table 4-1 presents the analysis regimen which is being used by the FEMP site-wide environmental air monitoring program.

As presented in columns #6c and #6d of Table 3-2, based on relative contribution to predicted total dose from OSDF remedial action project activities, it is apparent that:

- The first four isotopes in Table 3-2, all of which are included in the analysis regimen presented in Table 4-1, account for 98.51 percent of the predicted total dose.

- Neptunium-237, line (and rank order) # 5 in Table 3-2 but not included in Table 4-1, is predicted to contribute only 0.32 percent of the predicted total dose, and is predicted to be present at only 0.0018 percent of its DCG.

- Thorium-234, line (and rank order) # 14 in Table 3-2 but not included in Table 4-1, is predicted to contribute so little to the predicted total dose that its contribution does not register to two decimals places when expressed as a percent, and is predicted to be present at only 0.0000016 percent of its DCG.

For these reasons, addition of the two isotopes discussed above would add little valuable information. Based upon predicted potential emissions from the OSDF during

its construction, filling, and closure, the *IEMP*'s existing site-wide airborne particulate radionuclide monitoring and analysis regime (see Table 4-1) is considered sufficient for use in the OSDF air monitoring program without modification.

Select information from Table 3-2 is needed to evaluate the utility and timeliness of bi-weekly airborne particulate uranium analysis as a fundamental component to the OSDF air monitoring program. The pertinent information is presented below, using column and entry numbering from Table 3-2.

Line	2 Radionuclide	4c Contribution to Total Predicted Concentration (Mass-basis), %	5c Contribution to Total Predicted Concentration (Activity-basis), %	6c Contribution to Predicted Total Dose, %
2	Uranium-238	86.59	42.60	23.22
8	Uranium-236	0.00	0.20	0.20
10	Uranium-235	0.10	0.17	0.17
13	Uranium-234	0.00	0.00	0.00
	Subtotal:	86.69	42.97	23.59

Thus, for the OSDF air monitoring program, bi-weekly airborne particulate uranium analytical data presents timely and sufficiently frequent information on the primary radiological contaminant in the FEMP's soil and soil-like remediation wastes which will fill the OSDF. Airborne particulate total uranium is indicative of approximately 85 percent of the predicted airborne concentration on a mass basis, approximately 45 percent of the predicted airborne concentration on an activity basis, and approximately 25 percent of the predicted dose. Because uranium accounts for greater than 85 percent of the radionuclide mass associated with potential airborne particulate releases from the OSDF, bi-weekly data on total suspended particulates and airborne particulate total uranium are optimal means to spot any increases in the type of air emissions which are expected from the OSDF. Furthermore, the bi-weekly frequency means that two to three sets of data are available each month for a yearly total of 26 sets of data on these optimal indicators.

A review of historical site-wide environmental air monitoring data and its use in calculating doses indicates that uranium contributes the largest fraction (in excess of 90

percent) of the dose due to inhalation of airborne particulates. Furthermore, most of the other radionuclide analytes are radioactive decay products of uranium and can be assumed to be at some level of equilibrium with their uranium parent (e.g., Thorium-230 is part of the Uranium-238 decay chain). Other radionuclide analytes (Thorium-232, fission and activation products) which are not related to uranium through a decay chain can be scaled to the uranium concentration in a remediation waste stream. This allows the airborne particulate total uranium results to be used as an indicator for other radionuclide concentrations. Because it is the primary radiological contaminant in FEMP's remediation waste, and the handling of remediation waste does not involve chemical processes which could selectively concentrate and release other target radionuclides, uranium is expected to remain the major contributor to potential airborne particulate radionuclide emissions throughout the operation of the OSDF.

Thus, the significance of uranium in contributing to potential air emissions, and to air inhalation doses, along with the ability to use total uranium results as a coarse indicator (or scaler) for the concentrations of other radionuclides, justifies relying on airborne particulate total uranium analysis as a timely and sufficiently frequent indicator in environmental air monitoring.

4.2.4 SUMMARY

The nature of potential emissions as visible airborne particulates, the low magnitude of predicted emissions and public health impacts, and the addition of real-time visual evaluation of visible airborne particulate emissions under the OSDF air monitoring program, with proactive airborne particulate (fugitive dust) emissions control under the OSDF remedial action project, when combined with bi-weekly total suspended particulate emissions monitoring and bi-weekly airborne particulate total uranium monitoring existing under the *IEMP*'s site-wide environmental air monitoring program, provide timely, meaningful and sufficient information to manage the OSDF remedial action project from an emission control and public health impact perspective. The airborne particulate analytical regime is summarized in Table 4-1. The monitoring locations for the environmental air monitoring program elements which involve analyses are summarized in Table 4-2; monitoring locations are presented in the figures presented earlier in this section.

Table 4-2
Summary of OSDF Air Monitoring Program Elements Involving Analyses

Program Element	Monitoring Locations	
	Downwind	Closest to Potential Public Exposure Points
Air particulates/uranium/radionuclides	AMSs 3, 8A & 9B	N-NNE: AMS 2 SSE: AMS 4
Environmental radon	D & E	N-NNE: C & AMS 2 S-SSE: F, G & AMS 4
Direct radiation	N/A	N-NNE: AMSs 2 & 8A E: AMSs 3 & 9B SSE: AMS 4

KEY:

AMS:	Air Monitoring Station
N/A:	Not applicable
NNE:	North-Northeast
N-NNE:	North to North-Northeast
SSE:	South-Southeast
S-SSE:	South to South-Southeast

Real-time visual evaluation of visible airborne particulate emissions under the OSDF air monitoring program, along with proactive airborne particulate (fugitive dust) emissions control under the OSDF remedial action project, are discussed in Section 5.

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5. MONITORING IMPLEMENTATION

5.1 OVERVIEW

The implementation of OSDF air monitoring program during OSDF remedial action project activities is discussed in this section. This section discusses background monitoring to establish baseline data prior to OSDF construction activities, monitoring during impacted materials placement, and monitoring during OSDF closure activities. As previously stated under Section 1.1, activities during the post-closure period of the OSDF will be addressed in a plan to be developed later.

5.2 BASELINE MONITORING

The FEMP's environmental direct radiation monitoring (Section 4.1.3) and environmental radon monitoring networks (Section 4.1.4) are in place and operational. The FEMP's AMS high-volume air sampler network for total suspended particulates, airborne particulate total uranium, and airborne particulate radionuclides (Section 4.1.4) also is in place and operational. Data from these existing networks will be used to establish baseline levels prior to initiation of OSDF construction activities. Baseline levels will be used in the review and interpretation of air monitoring data during OSDF activities.

5.3 MONITORING DURING REMEDIAL ACTIVITIES

5.3.1 DIRECT RADIATION, RADON, AND AIRBORNE PARTICULATE MONITORING

During OSDF remedial action project activities, the same environmental monitoring activities conducted during the baseline monitoring period (Section 5.2) will be conducted. Additional environmental monitoring activities as presented in Section 5.3.2 will also be conducted.

5.3.2 VISIBLE PARTICULATE EMISSIONS ABATEMENT AND VISUAL MONITORING

The short-term risk assessment of the *OU5 FS* [DOE, 1995c] indicates that wind blown dust is a minimal contribution to airborne particulates. Most of the particulate matter is a result of soil movement, impacted material placement, and vehicle traffic.

Visible particulate emissions produced from impacted materials placement activities will be attenuated through standard abatement procedures ("reasonably available control measures" as listed in OAC 3745-17-08(B)), including administrative and engineering controls. OSDF remedial action project visible particulate emissions control requirements have been identified in the *OSDF Impacted Materials Placement Plan*, the *OSDF Systems Plan*, the *OSDF Borrow Area Management and Restoration Plan*, and the appropriate specifications. Administrative and engineering controls are established in the plans for minimizing dust and fugitive emissions. Examples of administrative controls include: leaving topsoil and vegetative cover in the borrow area in place until the area becomes active; limiting active borrow area acreage; limiting vehicular traffic speeds on haul roads; and not placing impacted materials into the OSDF when wind speeds exceed certain levels. Examples of engineering controls include: covering loads of borrow soil or impacted materials; application of water to haul roads to limit dust generation; and use of crusting agents and temporary covers during seasonal shutdown of the OSDF.

Visual monitoring will be used to assess in real time visible particulate (fugitive dust) emissions and the effectiveness of these abatement controls in accordance with 40 CFR Part 60 Appendix A Method 22, Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions and Flares.

5.3.3 OCCUPATIONAL AIR MONITORING

In addition to the environmental air monitoring activities presented above, during impacted material placement into and closure of the OSDF, occupational (including radiological safety) air monitoring will be conducted using direct reading instruments or other accepted occupational safety exposure sampling methods. Occupational methods typically measure total or respirable dust present, whereas radiological safety methods typically directly measure radiological disintegrations per minute. Such

occupational air monitoring will invoke action levels relative to the potential hazard level indicated for fugitive dust with potential hazardous or radiological contaminants. Exceedance of those action levels will be cause to re-evaluate, either singly or in combination, administrative and/or engineering controls, including fugitive dust suppression controls, personal protective equipment, and the frequency of occupational air monitoring.

5.4 MONITORING DURING OSDF POST-CLOSURE PERIOD

As previously stated under Section 1.1, activities during the post-closure period of the OSDF will be addressed in a plan to be developed later. In order to obtain post-remediation background data, it is currently anticipated that the high-volume air samplers will be operational two months after closure of the last cell of the OSDF. This data will allow for verification of the assumption that after completion of the OSDF, fugitive dust emissions should be negligible.

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6. DATA INTERPRETATION, RESPONSE AND REPORTING

6.1 OVERVIEW

This section describes actions to be taken based on environmental air monitoring during OSDF remedial action project activities. As stated in the *OU2 ROD* [DOE, 1995a] and *OU5 ROD* [DOE, 1996a] and their respective Responsiveness Summaries, summaries of the environmental air monitoring data will be made available to EPA, OEPA, and also to the public in a timely manner through the Public Environmental Information Center (PEIC). It is the responsibility of FERMCO to coordinate this effort with the PEIC. This section also provides for annual review to evaluate the efficacy of this plan in meeting OSDF environmental air monitoring program objectives.

6.2 DATA INTERPRETATION AND RESPONSE

6.2.1 VISIBLE PARTICULATE EMISSIONS

It is the responsibility of the Visible Emissions Evaluator to be visually observant of activities conducted that could cause visible particulate (fugitive dust) emissions to occur. If visible particulate emissions are detected, the Visible Emissions Evaluator will first verify the visible emission. After verification, the Visible Emissions Evaluator will notify the FERMCO Construction Contracts Manager that emission controls are not effectively controlling fugitive dust emissions. The Visible Emissions Evaluator will log in the date; time; activities within the battery limit of the OSDF as well as outside the battery limit that could contribute to the visible emissions; and actions that were taken to further the control of visible particulate (fugitive dust) emissions.

6.2.2 TOTAL SUSPENDED PARTICULATES, URANIUM AND RADIONUCLIDE DATA

A trending comparison will be made upon receipt of the bi-weekly total suspended particulate and airborne particulate total uranium sample data. Results for both will be compared against the baseline values established under baseline monitoring (see Section

6.3), and the sum of the baseline concentration plus the *OU5 FS* short term risk assessment's predicted potential concentration of 8.3 x 10^{-10} mg/m^3 (see Section 3.3) for the airborne particulate total uranium data. For the OSDF air monitoring program, bi-weekly airborne particulate uranium analytical data presents timely and frequent information which is indicative of approximately 45 percent of the predicted airborne concentration on an activity basis and approximately 25 percent of the total predicted dose. The bi-weekly frequency means that two to three sets of data are available each month for a yearly total of 26 sets of data on this indicator.

Should visible particulate emissions occurrences, total suspended particulates data, or airborne particulate total uranium data, show that administrative action levels are not being met, then recommendations for improved administrative and engineering emission control measures will be made.

Occupational (including radiological safety) monitoring will invoke action levels relative to the potential hazard level indicated for fugitive dust with potential hazardous or radiological contaminants. Exceedance of those action levels will be cause to re-evaluate, either singly or in combination, administrative and/or engineering controls, including fugitive dust suppression controls, personal protective equipment, and the frequency of occupational (including radiological safety) air monitoring.

Comparisons of environmental (not occupational or radiological safety) monitoring results to DCGs, both as 1.0 DCG and as 0.1 DCG, will be performed by FERMCO to evaluate the radionuclide data to assess the potential to exceed the limits on dose (*e.g.*, 100 and 10 mrem/year, all-pathway and air-pathway, respectively) to members of the public from activities occurring at the FEMP. The DCGs for the target analytes of this OSDF air monitoring program are listed in Table 3-2. The radionuclide results will be reviewed as part of an annual evaluation of the OSDF environmental air monitoring program, as described further below in Section 6.3.

This approach and frequency are considered more than sufficient in light of the conclusions presented in Section 3 and reiterated below:

- The exposure pathway of greatest concern is through inhalation of particulate emissions containing radionuclides.

- Visual emissions monitoring is the EPA-recognized methodology (40 CFR Part 60 Appendix A Method 22) for assurance of dust and fugitive particulate emissions control.

- Only the on-property remedial workers could potentially incur risks exceeding 1 in 1,000,000 (1×10^{-6}) and no greater than 9.4×10^{-4}.

- The potential risk to public health due to OSDF construction and impacted materials placement is low — less than 1 in 1,000,000 (1×10^{-6}) and no greater than 4 in 10,000,000 (4×10^{-7}).

- The radionuclide concentrations predicted from OSDF activities result in a dose to the off-property public of 0.56 mrem/year, which is

  - *approximately 200 times lower* than the DOE Order 5400.5 Chapter II(1)(a) dose limit of 100 mrem/year, and

  - *approximately 20 times lower* than the EPA's 40 CFR Part 61 Subpart H and DOE Order 5400.5 Chapter II(1)(b) air pathway dose limit of 10 mrem/year.

- When compared to the DCG — which corresponds to an airborne dose limit of 100 mrem/year — none of the predicted radionuclide concentrations exceed 1/10th (1×10^{-1}, or 10 percent) or even 1/100th (1×10^{-2}, or 1 percent) of its DCG; only two (Thorium-230 and Uranium-238) exceed 1/1,000th (1×10^{-3}, or 0.1 percent) of their respective DCGs; while a third (Thorium-232) exceeds 1/10,000th (1×10^{-4}, or 0.01 percent) of its DCG.

- When compared to a level of 0.1 DCG — which corresponds to the DOE and EPA airborne dose limit of 10 mrem/year — none of the predicted radionuclide concentrations exceeds its corresponding level; none even exceed 1/10th (1×10^{-1}, or 10 percent) of this level; only two (Thorium-230 and Uranium-238) exceed 1/100th (1×10^{-2}, or 1 percent) of this level; while a third (Thorium-232) exceeds 1,000th (1×10^{-3}, or 0.1 percent) of this level.

- These are based on a hypothetical receptor located immediately adjacent to the FEMP property boundary at the fence line for the entire duration of the FEMP cleanup process. The projected risk and dose to a near-property receptor located at any other position

or any shorter duration would be expected to be less than these projections.

- Additionally, the application of mitigative measures to reduce fugitive dust emissions will reduce these projected concentrations, risks, and doses.

6.3 PERIODIC PROGRAM EVALUATION

The OSDF environmental air monitoring program will be reviewed at least annually to evaluate the effectiveness in meeting the OSDF air monitoring program objectives. The review will focus on, but not be limited to, the following areas of the program:

- the number and location of OSDF AMSs, particularly in regard to prevailing wind direction and nearby off-property population as these may change over time;
- the frequency of airborne particulate analyses;
- advances in monitoring and analytical technologies that become field-proven, commercially available, and acceptable to the regulatory agencies; and
- the effectiveness of administrative and engineering dust emission controls.

The environmental air monitoring results will also be reviewed and the information used to evaluate the program with respect to available historical FEMP environmental air data and the progressive findings of the environmental air monitoring program. Based on this review, certain aspects of the OSDF environmental air monitoring program could be modified. Should visible particulate emissions occurrences and radionuclide data show that administrative action levels are not being met, then recommendations for improved administrative and engineering emission control measures will be made.

This annual review corresponds with the living nature of the Integrated Environmental Monitoring Program, on which this OSDF air monitoring program is heavily reliant. As presented in the *IEMP*, the Integrated Environmental Monitoring Program will undergo a structured schedule of annual reviews and two-year mandatory revisions.

IEMP annual reviews will evaluate the Integrated Environmental Monitoring Program against the anticipated mix of remediation activities scheduled to occur in the following two years. The *IEMP* annual review cycle provides the mechanism for identifying and initiating program modifications necessary to align the Integrated Environmental Monitoring Program with the mix of near-term remediation activities.

The *IEMP* two-year mandatory revision will incorporate all changes initiated as a result of the Integrated Environmental Monitoring Program's annual review process. That revision would also identify any Integrated Environmental Monitoring Program modifications necessary as a result of progressive findings of the Integrated Environmental Monitoring Program, any changes to existing regulatory agreements or requirements applicable to site-wide monitoring, and any changes as necessary resulting from Ohio EPA's independent review and assessment mechanism embodied in the 1993 Agreement in Principle (AIP) between Ohio EPA and DOE.

6.4 REPORTING

OSDF environmental air monitoring program reporting will be conducted under the reporting scheme and frequency established under the *IEMP*.

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7. REFERENCES

American National Standards Institute (ANSI), *Performance, Testing and Procedural Specifications for Thermoluminescent Dosimetry: Environmental Applications*, ANSI N545-1975, 1975.

FERMCO, *Fernald Site Environmental Monitoring Plan (PL-1002, Revision No. 2)*, Fernald Environmental Management Project, U.S. Department of Energy, Fernald Field Office Contract DE-AC24-92OR21972, 1995a.

FERMCO, *1994 Site Environmental Report*, U.S. Department of Energy, Fernald Field Office Contract DE-AC24-92OR21972, 1995b.

GeoSyntec Consultants, *Design Criteria Package: On-Site Disposal Facility*, Fernald Environmental Management Project, 1995.

U.S. Department of Energy (DOE), *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE/EH-0173T), January 1991.

U.S. Department of Energy (DOE), *Final Feasibility Study for Operable Unit 2*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995a.

U.S. Department of Energy (DOE), *Final Record of Decision for Remedial Actions at Operable Unit 2*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995b.

U.S. Department of Energy (DOE), *Final Feasibility Study Report for Operable Unit 5*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995c.

U.S. Department of Energy (DOE), *Pre-Design Investigation and Site Selection Report for the On-Site Disposal Facility*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1995d.

U.S. Department of Energy (DOE), *Record of Decision for Remedial Actions at Operable Unit 5*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996a.

U.S. Department of Energy (DOE), *Integrated Environmental Monitoring Plan*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996b.

U.S. Department of Energy (DOE), *Operable Unit 3 Record of Decision for Final Remedial Action*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996c.

U.S. Department of Energy (DOE), *Permitting Plan and Substantive Requirements for the On-site Disposal Facility*, Fernald Environmental Management Project, DOE Fernald Field Office, Fernald, OH, 1996d.

U.S. Environmental Protection Agency (EPA), *Control of Air Emissions from Superfund Sites*, Office of Research and Development, EPA/625/R-92/012, November 1992.

Waite, D.A., *An Analytical Technique for Distributing Air Sampling Locations Around Nuclear Facilities*, BNWL-SA-4534, Pacific Northwest Laboratory, Richland, Washington, 1973.