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1997



ANNUAL REPORT TO THE PUBLIC

on the **FERNALD** Environmental Management Project

Prepared by:



Ohio Environmental Protection Agency
OFFICE OF FEDERAL
FACILITIES OVERSIGHT

Combined Report
Agreement In Principle (# DE-FG05-940R22206)
& Cost Recovery Grant (# DE-FG05-940R22167)



State of Ohio

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Ohio Department of Health

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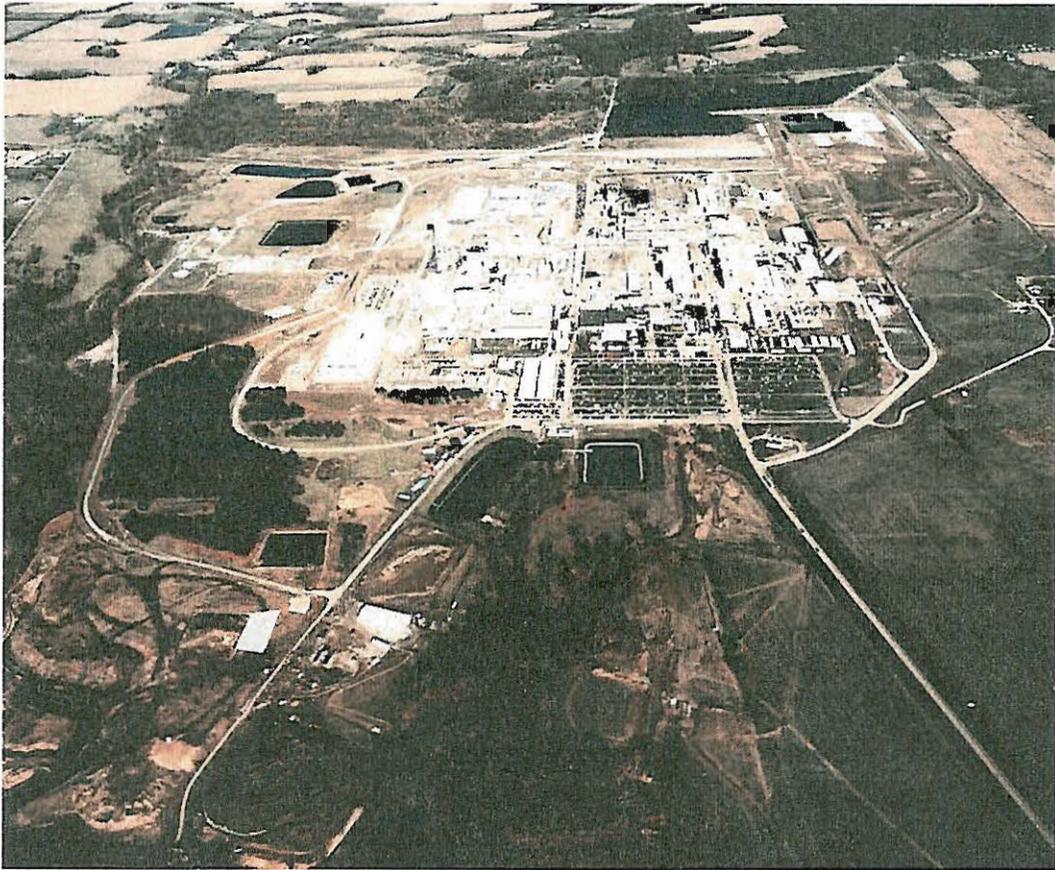
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AIP	Agreement in Principle
ALARA	As Low As Reasonably Achievable
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CRG	Cost Recovery Grant
CRO	Community Reuse Organization
D&D	Decontamination and Dismantlement
DOE	Department of Energy
EMAB	Environmental Management Advisory Board
ESD	Explanation of Significant Difference
FCAB	Fernald Citizens Advisory Board
FHES	Fernald Health Effects Subcommittee
FRESH	Fernald Residents for Environmental Safety & Health
FRL	Final Remediation Level
FSP	Field Sampling Plan
GIS	Geographic Information System
GPS	Global Positioning System
IEMP	Integrated Environmental Monitoring Plan
NRDA	Natural Resources Damage Assessment
ODH	Ohio Department of Health
Ohio EMA	Ohio Emergency Management Agency
Ohio EPA	Ohio Environmental Protection Agency
OFFO	Office of Federal Facilities Oversight
OU	Operable Unit
OSDF	On-Site Disposal Facility
RCRA	Resource Conservation and Recovery Act
SWDO	Southwest District Office of Ohio EPA
TSP	Total Suspended Particulates
USEPA	United States Environmental Protection Agency
WAC	Waste Acceptance Criteria



Fernald Environmental Management Project is located 18 miles northwest of Cincinnati. Cleanup progress is especially evident in the south and east portions of the site. (November, 1997 – photo courtesy of Fluor Daniel Fernald)

1.0 INTRODUCTION

The purpose of this report is to document the State of Ohio's oversight activities at the United States Department of Energy's (DOE) Fernald Environmental Management Project. The report is written to provide interested parties a single source of information regarding Ohio's regulatory, environmental monitoring, public outreach, and planning activities at Fernald during calendar year 1997. In addition, this report completes one of Ohio's commitments under the Agreement in Principle (AIP) between Ohio and DOE.

INTRODUCTION

1.1 AGREEMENT IN PRINCIPLE

The AIP outlines goals and commitments to be carried out by the State of Ohio and DOE during the Fernald cleanup and provides funding to Ohio for cleanup oversight. Ohio's objectives in this agreement are to: 1) extend agency non-regulatory oversight and review to Fernald's Environmental Monitoring Program; 2) assist in emergency preparedness planning; and 3) enhance public involvement and education. The AIP was signed in October of 1993. Implementation of the AIP began in 1994.

Ohio Environmental Protection Agency (Ohio EPA) is the lead agency for Ohio's implementation of the AIP. Ohio Department of Health (ODH) and Ohio Emergency Management Agency (Ohio EMA) provide support in health physics and emergency preparedness planning, respectively. The Office of Federal Facilities Oversight (OFFO) coordinates Ohio EPA's Fernald activities. Under the AIP, in 1997 Ohio conducted environmental monitoring, revised the draft *Field Sampling Plan (FSP)*, solicited public involvement, provided monitoring data to the public, participated in national discussions on DOE issues, and conducted emergency planning activities with local planning agencies.

Starting in 1998, Ohio EPA and DOE have agreed to combine the AIP grant into the Cost Recovery Grant. This change is aimed at increasing efficiency in grant processing and financial matters as well as better aligning Ohio's oversight with site activities.

1.2 COST RECOVERY GRANT

Ohio EPA has a long-standing regulatory role at Fernald. The 1988 Consent Decree between DOE and the State of Ohio provided a mechanism for recovery of costs associated with regulatory oversight. In 1993, the Cost Recovery Grant (CRG) was finalized to provide these costs in a financial assistance award, eliminating the need for annual reimbursement. This arrangement allowed Ohio to provide more active oversight early in the cleanup process through dedication of additional staff and resources to the project.

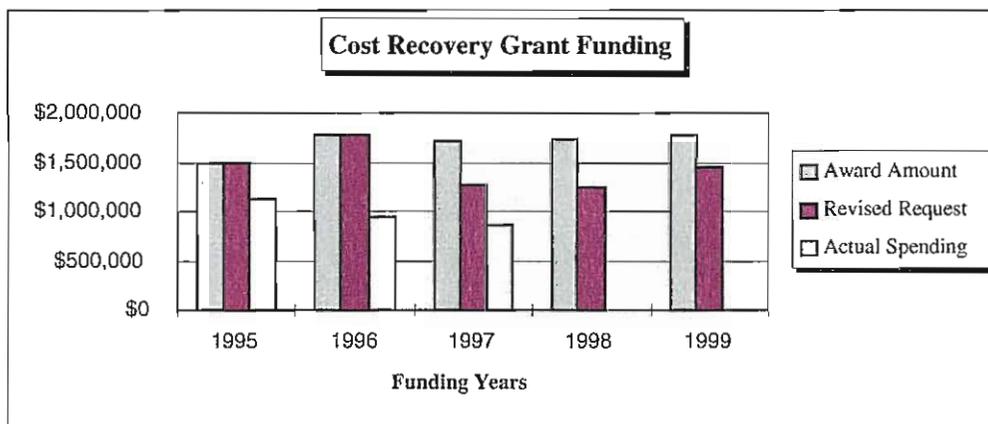
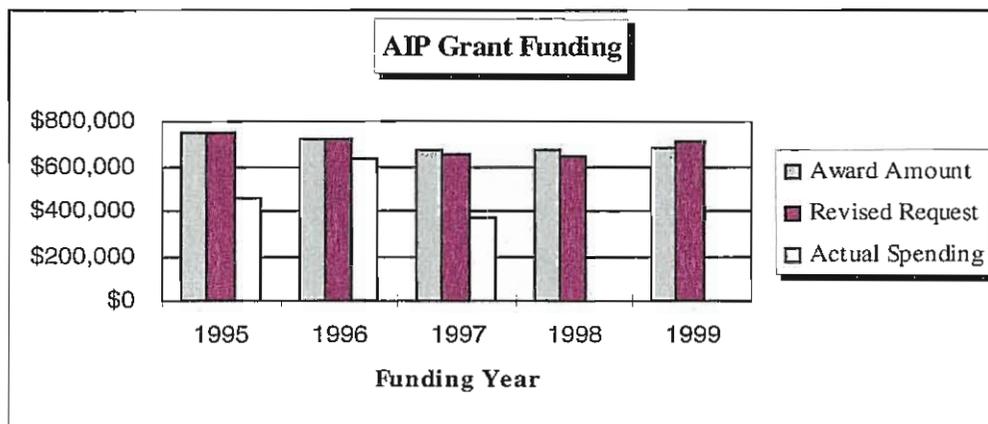
Ohio EPA is the State's lead agency for implementation of the CRG. ODH provides health physics support and data validation services. Ohio EPA conducts regulatory oversight for implementation of the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and other environmental laws and regulations. Ohio EPA also works toward resolution of our Natural Resource Damage Assessment claim under the CRG. In addition to regulatory activities, Ohio EPA conducts public outreach and environmental sampling under the CRG. Enhancing public involvement in decision making has been an important goal of Ohio's CRG program.

Ohio's actions under the CRG focus on environmental contamination resulting from the facility's former production activities. Ohio's role includes the review of DOE plans and reports for implementation of selected remedies. This review helps ensure that the selected remedies are protective of human health and the environment, comply with regulations, and are cost-effective. Ohio reviews the design and oversees implementation of the selected remedial actions and collects environmental samples to ensure remedial action is conducted in a manner that limits impacts on the environment.

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1.3 FUNDING

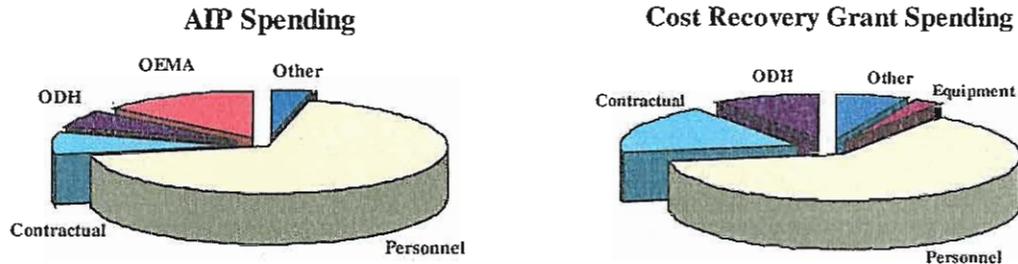
The graphs below represent profiles of the funding provided to the State of Ohio by DOE under the AIP and CRG for oversight at Fernald. Significantly less money was spent during fiscal year 1997 than was provided in the original grants. The dollars saved are the result of efforts by Ohio to streamline costs and increase efficiency. Examples of this include optimization of sampling and decreases in requested staffing.



Money saved by Ohio can then be applied to cleanup at Ohio DOE sites.

Ohio's revised funding requests for State Fiscal Year 1998 (\$644,940 AIP, \$1,247,256 CRG) represent 5% and 30% reductions from the original AIP and CRG funding requests, respectively.

The distribution of expenditures for grant year 1997 is provided in the figures below.



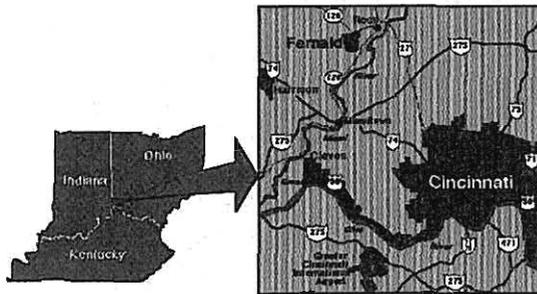
Personnel expenditures include salaries, fringes, and indirect costs. Contractual includes medical monitoring, laboratory analytical and remedial oversight contractor costs. Operating costs, supplies, training and travel make up the “other” expenditures.

Ohio spent \$855,423 from the CRG fiscal year '97 funding. This expenditure is a 50% saving of the funds available under the original award. For AIP activities, Ohio spent \$396,617 of the funds allocated for the third year, representing a 45% saving over the original award amount. A significant portion of the cost savings in this AIP grant year and the reason for the large difference between '96 and '97 expenditures is the duration of the grant year. Award of the '97 AIP was delayed resulting in a three month extension of grant year '96. Thus, expenditures for '96 covered 15 months (7/1/95-9/30/96) while those for '97 covered 9 months (10/1/96-6/30/97).

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1.4 SITE BACKGROUND

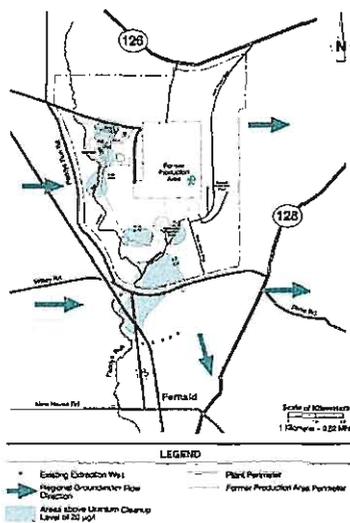
The site, formerly known as the Feed Materials Production Center, is a 1050-acre



facility located in a rural, residential area 18 miles northwest of Cincinnati. The facility was constructed in the early 1950s and production began in 1952 with National Lead of Ohio as the operator.

Uranium metal products for the nation's defense programs were produced at Fernald, including slightly enriched and depleted uranium. Smaller amounts of thorium metal were also produced. Production stopped in July 1989 to focus resources on environmental restoration. In December 1989, the site was added to the United States Environmental Protection Agency's (USEPA) National Priorities List. In 1991, DOE officially ended production and the site was renamed the Fernald Environmental Management Project. Fluor Daniel Fernald assumed responsibility for cleanup of the Fernald site from Westinghouse in 1992. The following environmental threats affect the Fernald environment:

Ground Water: The Fernald site is located over the Great Miami Aquifer, which is



designated a sole source aquifer and considered a valued natural resource. Ground water is contaminated with above background concentrations of uranium approximately one mile south of the site in what is referred to as the "south plume." DOE provided bottled water for residents in the plume area from February 1991 until 1996 when a public drinking water system became operational. In 1993, the south plume removal action was implemented to slow off-site migration of the uranium plume.

Waste Pits: The six waste pits used during operations contain approximately one million tons of soils and waste, including uranium, thorium, and other radioactive and chemical contaminants. The pits range in size from a football field to a baseball diamond, and vary in depth from 13 to 30 feet. Two of the pits have water covers, one has a synthetic cap, and the other pits have soil covers. The waste pits are either in close proximity to, or in contact with, the Great Miami Aquifer and are contributing to ground water contamination. In 1991, a successful removal action was implemented to reduce stormwater runoff from the waste pits into Paddy's Run. This removal action significantly reduced the contaminant levels reaching Paddy's Run from the waste pits.

Silos: There are four concrete silos at Fernald that were constructed to store radioactive materials. Two of them, referred to as the K-65 silos, contain high radium-bearing residues, one contains lower-level dried uranium residues, and one has never been used. To reinforce the structurally flawed K-65 silos, a soil berm was added in the 1960s and enlarged in the early 1980s. In 1991, bentonite clay was injected into the tops of the two K-65 silos to cap the high radium residues and reduce radon emissions from the silos. The silos continue to retain the potential to release significant volumes of radioactive contaminants.

Past Releases: According to an independent dose reconstruction study*, an estimated 340 tons of uranium were released during production at Fernald. The study also estimates 170,000 curies of radon were released from the K-65 silos. Numerous other radioactive and hazardous materials have contaminated the soils and ground water at the Fernald site. In March of 1998, Centers for Disease Control and Prevention released results from their draft Risk Assessment estimating the number of lung cancer deaths occurring between 1951 and 2088 may be increased by 1% to 12% from Fernald-related radiation exposures. The study focused on lung cancer because exposure to radon contributed 70%-90% of the lung dose to the Fernald community.

* These estimates are reconstructions of past releases and are based on incomplete data. The review of historic data was conducted by Radiological Assessments Corporation (*The Fernald Dosimetry Reconstruction Project*, August 1996).

ACTIVITIES AND ACCOMPLISHMENTS

2.0 ACTIVITIES AND ACCOMPLISHMENTS

Ohio continued to work diligently in 1997 to keep up with Fernald's accelerated cleanup schedule. Major construction activities in the on-site disposal facility (OSDF) and Southern Waste Units were initiated. Removal Actions, including Paddys Run bank stabilization, added to the work at Fernald. The implosion of Plant 1 in the spring contributed to the changing landscape at Fernald. These and other accomplishments were witnessed by Ohio EPA staff as increased field visits improved regulatory oversight. Ohio EPA and ODH technical staff reviewed and granted State approval on numerous documents. To assist in these and other regulatory functions, Global Positioning System (GPS) and Geographic Information System (GIS) equipment were fine-tuned for more accurate and efficient applications. OFFO staff participated in numerous public meetings that kept the community informed of progress at Fernald. Ohio continued efforts to maintain high quality emergency planning operations and to work with DOE on numerous national level issues.

The overall strategy for remediation of the Fernald site continues to be a balanced approach, which includes removing the most contaminated materials for off-site disposal, while disposing of the less contaminated, high volume materials on-site. Substantial efforts will be made in 1998 to ensure the balanced approach is maintained by addressing off-site shipping obstacles. Ohio's activities and accomplishments for 1997 are further explained in the following sections.

2.1 REGULATORY OVERSIGHT

The site first began remedial investigation activities as part of a 1986 Federal Facility Compliance Agreement between USEPA and DOE. In 1988 a Consent Decree between the State of Ohio and DOE was signed, which also required completion of the CERCLA cleanup. Following a listing on the 1989 National Priorities List, a CERCLA Consent Agreement was signed by USEPA and DOE in 1990. Although two separate agreements requiring cleanup exist, Ohio EPA and USEPA work together on all aspects of the project.

As part of Ohio's oversight role at the Fernald site, more than 80 technical documents were reviewed and commented on and/or approved in 1997. Most of these documents related directly to the on-going remediation of the facility including design packages, implementation plans, certification report, and work plans. In addition to these regulatory reviews, Ohio EPA conducted numerous on-site inspections, including RCRA and Clean Water Act inspections, of on-going cleanup actions.

During 1997 DOE and Fluor Daniel Fernald made substantial remediation progress. Large-scale cleanup actions including soil removal, waste excavation, disposal facility construction and extraction/injection well installation were initiated. These activities resulted in significant changes to the site landscape, which testify to the change from a study phase to actual cleanup.

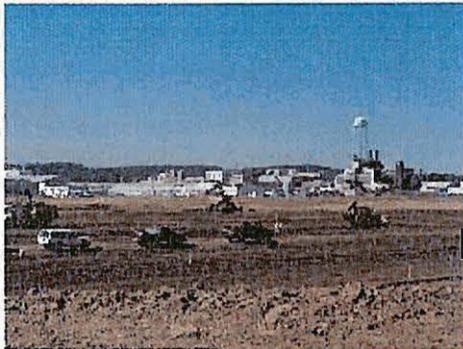
Over the past year the site reorganized around projects rather than the Operable Units (OU) used previously. In an attempt to be consistent with on-going site structure, the following updates explain projects and their progress during 1997.

Waste Pits Remedial Action Project (formerly OU1): The waste pit contents will be excavated, thermally dried, and ship by rail to a commercial disposal facility. During 1997, activities included upgrades of railroad trestles along the unit train route and construction of on-site rail system improvements. Additionally, IT Corporation

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was awarded the Alternative Remedial Action Subcontracting Approach contract for remediation of the waste pits. An initial meeting was held with IT, where Ohio EPA explained expectations for waste pit remediation. Design and construction of the treatment facility is expected to occur in 1998.

On-Site Disposal Facility Project (formerly OU2, OU3, OU5):



Above, grading and compaction of the clay liner for Cell 1 in September, 1997. Right, placement of the secondary liner over the clay liner.



Right, primary liner is being placed over the secondary liner in November. Below, first waste placement in the OSDF on December 23rd.



Contaminated material including soil and debris will be disposed in the OSDF. Any waste that exceeds the waste acceptance criteria (WAC) will be treated to meet the criteria or disposed off-site. No off-site waste will be allowed in

the OSDF. Construction of the OSDF cell number one was the major 1997 activity, including the liner and leachate collection system. First waste placement

in the disposal facility occurred in December, nearly 3 months ahead of schedule.

Approximately 12,000 yd³ of contaminated soil were disposed in the OSDF during 1997.

Facilities Closure and Demolition Project (formerly OU3): All on-site buildings will be decontaminated and dismantled (D&D). All waste except that which exceeds the WAC will be disposed in the OSDF. The remote over-packing of 5,600 drums

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containing thorium residue was completed in May, ten months ahead of schedule. Plant 1 D&D was completed with its implosion in February. D&D was initiated in the Boiler Plant and Plant 9. Safe Shutdown was completed in Plant 5 and started in Plants 2/3 and 8.

Silos Project (formerly OU4): In July DOE and USEPA resolved the dispute regarding schedule delays in the Vitrification Pilot Plant. The dispute resolution resulted in two strategies for the silos. For Silo 3 an Explanation of Significant Difference (ESD) will be completed since it was determined that the change does not fundamentally alter the remedy selected in the Record of Decision with respect to scope, performance or cost. A Record of Decision Amendment will be completed for the K-65 Silos (1 and 2). This requires full regulatory review and sign-off as well as a formal public comment period. Proof of process testing will be completed on four technologies prior to completion of the Amendment. DOE will award contracts for Silo 3 treatment and Silos 1 and 2 proof of process testing in 1998.

Soils Characterization and Excavation Project (formerly OU2 & OU5):

Contaminated soils will be excavated and those soils meeting the waste acceptance criteria will be disposed in the on-site disposal facility. During 1997, excavation of contaminated soil in the northeast corner of the site (Area 1 Phase 1) was completed prior to the start of OSDF construction.

Preparation activities, including tree removal, fencing, and storm water control facility excavation, were initiated in the Southern Waste Units (Area 2 Phase 1). A new haul road from the Southern

Waste Units to the OSDF and a north access road were also completed.



Tree removal and chipping, above. Left, new haul road from the Southern Waste Units to SR 126.

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Aquifer Restoration and Waste Water Project (formerly OU5): The Great Miami Aquifer will be remediated by a combination of ground water extraction and injection. Installation of the extraction and injection well network and associated piping continued during 1997. Construction of additional capacity for treatment in the Advanced Waste Water Treatment facility occurred during 1997. The south plume extraction system continued to operate. Additional investigation of the three dimensional nature of the contaminant plume was completed. The public water supply to residents with impacted ground water was also completed in 1997.

RCRA Oversight: Ohio EPA's Division of Hazardous Waste Management continued oversight of Fernald's Site Treatment Plan activities. The Federal Facility Compliance Act of 1992 required DOE facilities to develop Site Treatment Plan's for mixed waste stored at DOE sites. Fernald's plan identified eight on-site treatment options to facilitate treatment of mixed wastes. Treatment and disposal of all waste in seven of these treatment options were completed in 1996. The amount of mixed waste stored on-site continues to decline. According to Fernald's 1998 annual update to the Site Treatment Plan, the facility completed treatment and disposal of 42% of the mixed waste remaining under the final treatment option (Ohio Mobile Chemical Treatment System) in 1997.

Ohio EPA's hazardous waste division conducted an annual RCRA Compliance Evaluation Inspection of the facility in April. There were no RCRA violations documented as a result of this inspection.

In 1997, the facility completed the last of the scheduled RCRA "clean closure" activities for specific Hazardous Waste Management Units. The remaining Units will be remediated in accordance with the RCRA/CERCLA Integration process developed by the facility and Ohio EPA.

Natural Resource Damage Assessment (NRDA): Ohio EPA is the authorized agency to act as natural resource trustee for the State of Ohio. The trustees' role is to

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act as guardians for public natural resources impacted by Fernald. Other trustees for Fernald include DOE and the Department of Interior. Over the course of 1997 the trustees worked on developing a comprehensive document to address impacts and restoration activities. The draft Natural Resource Restoration Plan includes an impact assessment, habitat equivalency analysis and a restoration plan. The Plan was developed by DOE and Fluor Daniel Fernald and reviewed by Ohio EPA and the Department of Interior. The draft Plan was provided to the Fernald Citizens Advisory Board natural resources committee and the Community Reuse Organization for review. The goal of the Fernald trustees is to integrate natural resource restoration activities into the CERCLA remediation efforts at the site. Another goal of the trustees efforts is to have the restoration activities result in settlement of the State of Ohio's NRDA claim against DOE. In addition to the specific NRDA activities, Ohio EPA participated in review and development of several natural resource related supplemental projects required by the Silos Project Dispute Resolution between USEPA and DOE. During 1998, work will start on implementing the supplemental projects as well as some Natural Resource Restoration Plan requirements.

Field Oversight: During 1997, Ohio EPA focused significant effort on field oversight of the various ongoing construction/remediation projects. During the last six months of the year Ohio EPA conducted over 60 site visits/inspections of site activities. The inspections focused on OSDF construction, storm water management, fugitive dust control, Southern Waste Unit site preparation, and other on-site activities. Ohio EPA conducted a National Pollutant Discharge Elimination System permit inspection as well as numerous informal stormwater inspections over the course of the year. Ohio EPA intends to refocus its organization activities around conducting more field oversight during the course of 1998.

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2.2 PUBLIC OUTREACH

Ohio EPA's public outreach program is designed to supplement monitoring and oversight activities by involving the public in important environmental decisions. Since every decision at Fernald ultimately affects the public, their inclusion and understanding of the cleanup process is essential. Person to person contact, along with quick, open responses from technical staff to public inquiries ensure that the public is included in decision-making. In 1997, OFFO investigated and responded to numerous public and media information requests received by mail, phone and the Internet. OFFO and ODH staff were active participants in DOE/Fluor Daniel Fernald



Two new community formats: Above, the Fernald Community Reuse Organization met monthly in 1997 to discuss how to offset the economic impacts of Fernald closure. Right, a representative of DOE updates the public at the new monthly Cleanup Progress Briefing.



sponsored events, the Fernald Citizens Advisory Board (FCAB), the Fernald Community Reuse Organization (CRO), the Fernald Health Effects Subcommittee (FHES), Fernald Residents for

Environmental Safety and Health (FRESH), and other public outreach activities. Ohio EPA's Fernald team is committed to

encouraging early and meaningful public participation in cleanup decisions. Public availability and working partnerships continue to be priorities for Ohio.

Public Meetings

The following list includes Fernald public meetings in which Ohio participated. Many of the meetings are for groups with which Ohio staff meets regularly or on a recurring basis.

- FRESH bi-monthly meetings*
- FCAB ex-officio participant*
- FCAB committee activities*
- Community Leaders Network-Chair*

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- Community Reuse Organization*
- CRO committee activities*
- Community Meetings/Monthly Progress Briefings*
- OSDF Public Meetings*
- Silos Independent Review Team*
- Silo 3 Alternatives Meetings*
- Silo 3 ESD Public Hearing
- OU5/OU2 Public Meeting
- OU5 Public Meeting
- Fernald Health Effects Subcommittee*
- Fernald Living History Project*
- Accelerated Cleanup Plan* (10 year videoconference)
- Native American Alliance of Ohio
- Stakeholder Summit
- Public Involvement Workshop
- OU4 Dispute Resolution Hearing
- Plant 4 Recycling Case Study
- DOE's Budget Unveiling

*OFFO staff participated in the recurring activities of these groups

OFFO representatives participate in most DOE sponsored public meetings and workshops, and give presentations where requested or appropriate. In 1997 several changes were made in the way public meetings are organized. Beginning in September, the monthly Cleanup Progress Briefing took the place of multiple meetings on separate nights. The Progress Briefing consists of a site update followed by an in-depth discussion of one particular issue. This format also replaces the quarterly Community Meetings. Ohio EPA staff regularly participate in these public meetings.

Also in 1997, groups such as the FCAB and the CRO worked under a newly emphasized committee structure. The FCAB addressed issues through existing committees (waste disposition, environmental monitoring, natural resources and transportation) as well as through two new committees, efficiency and steering. The efficiency committee was formed in July to address budget, priorities, streamlining, and special nuclear material. The steering committee serves to guide the FCAB through such issues as membership, structure and direction. OFFO participates in the full bi-monthly meetings of the FCAB as an ex-officio member, while at least one OFFO staff member participates in each committee. Note that the FCAB changed its

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name from the Fernald Citizens Task Force for greater continuity with other site-specific advisory boards.

In 1997 the Fernald CRO organized into committees in order to look at reuse issues. The committees include, land and equipment reuse, public involvement, economic development/worker transition, and other administrative committees. The CRO selected a technical advisor, Curt Paddock, who started in October. Ohio EPA participated in full CRO meetings in addition to several of the committee meetings. One staff member, acting as a Natural Resources Trustee, presented information to the land and equipment reuse committee.

What's in Print?

The following is a list of 1997 Ohio-generated resources relating to Fernald:

Publications:

- *Public Involvement in the Remediation of a Superfund Site*, poster paper written by Joe Bartoszek at the New England Association of Environmental Biologists 21st Annual Meeting, March 1997
- *1996 Annual Report to the Public on the Fernald Environmental Mgt Project*, prepared by OFFO to meet AIP Grant requirements.
- *DOE – How Are They Doing? A Perspective from the States*, prepared by Tom Winston, Jim Coon, and Graham Mitchell, to be presented at a DOE conference in early 1998.

Media Relations:

- Contributed to press release to launch the new district web site, November 1997

Fact Sheets:

- Revised Fernald Team reference sheet
- Quarterly Environmental Monitoring results fact sheets
- Revised Fernald Chronology

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Presentations:

- *Public Involvement in the Remediation of a Superfund Site*, poster paper presented by Joe Bartoszek at the New England Association of Environmental Biologists 21st Annual Meeting, March 1997
- *Stakeholder Involvement: Key to Deployment Success*, presented by Tom Schneider at the 8th Annual WGA/Weapons Complex Monitor Applied Research and Cleanup Technology Colloquium, April 1997
- Fernald Case Study presentation to three graduate classes at Miami University, one class at Wright State, and a broadcast class at University of Cincinnati/Ohio State University
- Fernald presentation to students from Earlham College
- Career Day presentations to high schools including, Chaminade Julienne, Notre Dame Academy, and Centerville HS

On the Internet

In its second full year on the Internet, OFFO's Fernald web site continued to be a valuable resource in our public involvement plan. During the year, OFFO responded to numerous public information requests from the Internet. Users can quickly view information about the Fernald cleanup and contact Ohio EPA staff via e-mail with further questions. The sharing of Fernald successes and problems worldwide may assist other cleanup sites conducting similar activities.

In 1997 many updates and changes were made to the web site. A digital camera was purchased in September. Digital images documenting progress on the OSDf, Southern Waste Units, Paddys Run Stabilization and other Fernald projects have greatly enhanced the web site. A real-time radon monitoring data page with hourly updates from two locations was created at the end of 1997 and will be on-line in early 1998. OFFO staff provided technical assistance to District Operations in conceptual and actual development of a new district home page. This page was announced to the

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public in November. OFFO switched to a new web server that enables us to host multiple web sites, including the new district site and the Hamilton County Environmental Action Commission site. New software for more enhanced, user-friendly web site development and maintenance was installed in 1997. OFFO staff attended two web development courses, *How to Build a Successful Web Site* and *Beginning FrontPage 97*, in February and June, respectively.

More information about the Fernald cleanup and other Ohio federal facilities activities can be found at OFFO's new address:

<http://offo2.epa.state.oh.us>

Miscellaneous

Fernald staff participated as members of the volunteer advisory board for the new Fernald Living History Project. This project is being developed by the University of Cincinnati's Center for Environmental Communication Studies, in partnership with Miami University's Institute for Environmental Sciences. The group, which has met monthly since October, will develop a format to preserve the social, cultural and political history of the Fernald community.

Additionally, staff members were active in other community outreach programs. OFFO's chief met with several college classes to discuss Fernald, including Ohio State University and Miami University's Sustainability Program. Ohio EPA's possible participation in Miami's Sustainability Program through focusing on working relationships and public involvement at Fernald were discussed. OFFO staff were active in SWDO CARES and Adopt-a-School, two environmental education programs geared towards the general public and children, respectively. Through participation in these groups, OFFO staff was able to participate in activities including the Children's Ground Water Festival, the Healthy People/Healthy Planet Expo, the Cincinnati Zoo Wildlife Weekend, and judging at a local elementary school science fair in February.

GIS AND GPS

Geographic Information System

The Geographic Information System (GIS) is a computer based mapping system capable of storing, manipulating, and analyzing geographical information. OFFO is developing and using a GIS because the system provides powerful analytical capabilities, and the system completes many existing tasks more effectively.

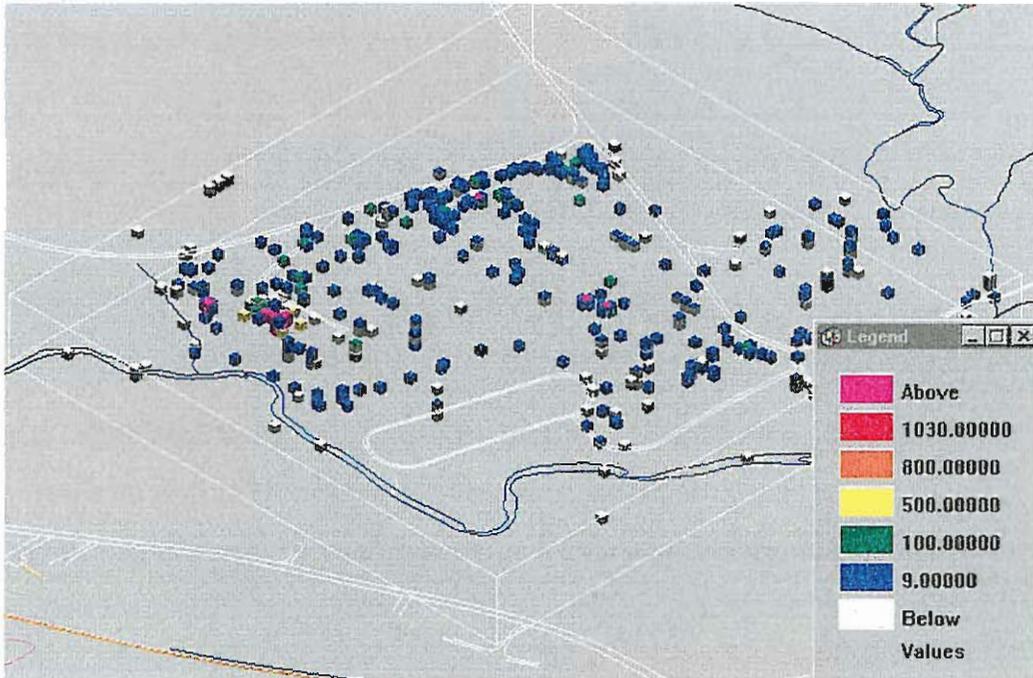
Not all relationships between data at the Fernald site are obvious. Due to the complex nature of contaminant transport at Fernald, relationships may exist between parameters, which would not be realized without the analytical capabilities of the GIS. The system allows technical staff to associate all existing data on waste materials and contamination with site information such as topography, stratigraphy, surface drainage features, and geology. These associations can then be analyzed and presented on maps that display visual correlations. These comparisons cannot be made easily without the GIS's ability to manipulate and integrate various types of data. GIS provides the tools necessary to effectively use the tremendous volume of data that has been collected at Fernald.

Availability of the GIS allows OFFO to perform independent analysis and review of DOE contractor generated data, models, maps, and designs. OFFO's independent analysis has increased regulatory confidence and the efficiency of design reviews. This system helps OFFO provide more efficient and cost-effective oversight for the DOE cleanup of the Fernald site.

In 1997, GIS work continued on modeling of the south plume and several projects related to soil remediation at the site. The following graphic shows total uranium in the area surrounding the southern waste units. This represents one phase of a modeling project used to increase understanding of the horizontal and vertical distribution of uranium through the southern waste units. This information is being used to guide review of excavation and other plans and to focus regulatory oversight

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on areas of particular concern.



Total Uranium in Soils, Southern Waste Units (mg/kg)

Through 1997, similar contaminant mapping projects were done involving metals contamination along the Paddys Run corridor and for RCRA materials and radionuclides west of the silos. Smaller scale projects were completed for various other areas scheduled for excavation.

Global Positioning System

Ohio EPA's Fernald team uses a Global Positioning System (GPS) to enhance oversight activities, in particular, the environmental monitoring program. GPS uses a series of satellites and a base station to reliably pinpoint geographic locations. In early 1996, the Ohio Department of Transportation surveyed in the exact location of the OFFO base station, thus allowing accuracy of field measurements to within a few inches. In 1997, the base station was resurveyed as part of a demonstration of new GPS equipment. The second survey confirmed the coordinates determined by the Ohio Department of Transportation.

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In 1997, OFFO continued to use the GPS to determine surface water sampling and private well locations. The geographic data from Ohio EPA's environmental monitoring program are entered into our local database for GIS analysis and interpretation. In 1997, OFFO staff continued to review GPS database location codes to ensure accurate query results. GPS data were used to create sampling location maps for fact sheets and public meetings. OFFO made base station data available to several divisions within Ohio EPA in 1997 via OFFO's Internet web site. OFFO offers this service upon request.

OFFO continues to use GPS equipment to determine sampling locations and efforts are underway to identify additional uses for the equipment. The GPS can also be used to record positional information for roads, trails, bridges, culverts, dwellings, land use, vegetation and wetland areas, creeks, rivers, addresses, test wells, and soil samples. The GPS will be used to determine former locations of buildings after demolition has taken place.

In 1997, OFFO made the decision to replace the existing GPS equipment with a more advanced rover unit and base station. Due to the age and limitations of the current equipment, OFFO would have difficulty completing anticipated projects. Through the use of the existing GPS equipment purchased in 1995, OFFO has become increasingly dependent on the accurate information provided by this technology. The acquisition of the new GPS hardware and software will expand data collection capabilities and substantially reduce data collection times. Purchasing activities for this equipment were initiated in late 1997. A description of the new equipment and associated projects will be covered in the 1998 Annual Report.

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2.4 PROGRAMMATIC AND NATIONAL ISSUES

In 1997, the Office of Federal Facilities Oversight continued efforts to be proactive in addressing regulatory, legislative and DOE programmatic issues with potential implications for the ongoing federal cleanup activities in Ohio. Through OFFO, the State of Ohio has also continued participation in numerous national initiatives relating to the DOE complex.

Interaction with other States individually and through national organizations continues to be an important component of Ohio's oversight program. OFFO staff worked with national organizations focusing on both programmatic and technical issues.

OFFO continued to participate in the development of accelerated cleanup plans through comment on several documents and frequent interaction with DOE and Fluor Daniel Fernald staff. Prioritization of work and pursuit of adequate funding are frequent topics and continue to be significant concerns to Ohio.

Ohio remained active in national discussions relating to DOE programmatic issues through participation in a number of national groups including include the National Governor's Association (NGA), State and Tribal Governments Working Group (STGWG), and DOE's Environmental Management Advisory Board (EMAB). It should be noted here that funding from DOE is not obtained for the majority of Ohio's participation with EMAB.

Waste and nuclear materials management on and off site remains an integral issue in the cleanup of Fernald and other Ohio sites. Ohio EPA staff attended the June 1997 National Dialogue pilot workshop in Oak Ridge, Tennessee. The initial intent of the workshop was to start a nuclear material and waste management dialogue at the national level. Eventually such a dialogue should lead to better understanding of DOE's waste management decisions. Improved dialogue regarding nuclear materials

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management between citizens, shipping and receiving states, and DOE is necessary if DOE intends to successfully implement many cleanups across the DOE complex.

Ohio's participation in EMAB includes two important committee assignments, the 2006 Committee and the Science Committee. The 2006 committee provides DOE with guidance on how to proceed with implementation of accelerated cleanup programs. The Science committee advises DOE on development of a science program that will allow the Department to operate effectively into the next century.

Technology related groups that OFFO staff worked with through 1997 include the Community Leaders Network (CLN), the Western Governors Association's Interstate Technology and Regulatory Cooperation (ITRC) work group, The Site Technology Coordinating Group (STCG), the Integrated Remedial Technologies Evaluation Program (IRTEP), and the Innovative Treatment Remediation Demonstration (ITRD). These groups share a focus on investigating technologies and steering technology development to enhance DOE's cleanup program across the complex.

OFFO participated in the DOE Office of Science & Technology's Community Leaders Network from 1993 through its demise midway through 1997. This network of individuals associated with sites across the DOE complex provided feedback for DOE's technology development activities. OFFO continues to provide input to DOE technology programs through other mechanisms.

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2.5 EMERGENCY MANAGEMENT PLANNING

Ohio EMA evaluated Fernald's hazards assessment. This effort required fact-finding and data collection. Data requests were submitted to the Fernald emergency management team. They provided hazards analysis, chemical modeling results and emergency plans for evaluation. The data was evaluated and compared to independent hazards assessment. The evaluation process is ongoing.

Ohio EMA continued to prepare for site emergencies at Fernald by improving its preparedness posture through training. Ohio EMA personnel attended several hazardous materials courses and attended various seminars related to response and emergency planning. Ohio EMA personnel provided a CAMEO (Computer Aided Management of Emergency Operations) course for Fernald area public sector responders.

The Fernald Community Planning and Training meetings served as a launching pad for many emergency management projects and exercises. Issues concerning joint public information, hazards assessments, emergency response mutual aid, communications, and warning were addressed. Many of the issues not only impacted the facility, but directly impacted Hamilton and Butler Counties. The meetings were well attended by Ohio EMA, as well as Hamilton and Butler County emergency management and first responders.

Under the AIP provisions, Ohio EMA provided pass-through funds to each of the counties emergency management agencies to be used for Fernald specific issues. They used the funds for such initiatives as preparing hazards assessments, participating in emergency response organizations, conducting exercises and drills, digitizing site specific information, participation in periodic communications checks, and monitoring the periodic tests of the Fernald warning system. Both county EMA's continued to revise their Fernald specific emergency plans and procedures.

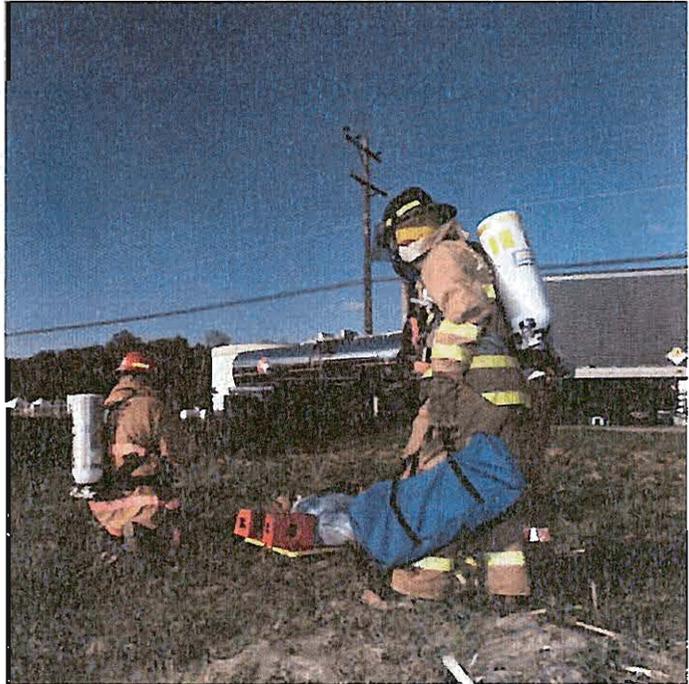
ACTIVITIES AND ACCOMPLISHMENTS

Ohio EMA participated in a full-scale joint response exercise near Fernald on May 20th. The purpose of the exercise was to test and evaluate major portions of Fernald's Emergency Plan as well as the integrated response capability of several organizations. A transportation emergency was simulated with local and state agencies responding to the scenario.

Additionally, Ohio EMA

participated in a criticality exercise in September. For the exercise, Fernald activated their Emergency Operations Center as well as their Emergency Response Team. Off-site response organizations, including Ohio EMA, were notified of the criticality.

Both the full-scale joint response exercise and the criticality exercise were deemed successful.



Emergency responders provide medical aid to a 'victim' in the May joint response exercise near Fernald.

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3.0 ENVIRONMENTAL MONITORING

The State of Ohio has conducted environmental monitoring at Fernald since 1985. Monitoring is performed to evaluate potential impacts to the public and the environment. Monitoring is also used to evaluate the success of ongoing cleanup activities. During 1997, on and off-site releases were monitored through regular sampling of environmental media, including ground water, surface water, soil, sediment, air, and produce.

In July of 1994, through the AIP, Ohio EPA's Office of Federal Facilities Oversight expanded the State's previous sampling efforts. Primary objectives of the AIP sampling program include monitoring impacts of past and ongoing releases at Fernald, evaluating DOE's environmental monitoring program, and informing the public of environmental monitoring data. In 1997, Ohio began revising their draft *Field Sampling Plan* in response to changes in *DOE's Integrated Environmental Monitoring Plan (IEMP)* and the adaptation of the AIP. The sampling plan is a working document, required by the AIP, which defines Ohio's environmental monitoring program, objectives, sampling locations, parameters, analytical methods, standard operating procedures, and data validation process. Ohio EPA is planning to complete the FSP in the spring of 1998.

Also in 1997, Ohio EPA reviewed and approved DOE's IEMP after extensive revisions. The IEMP is an effort to refine and coordinate site environmental monitoring activities. The IEMP integrates monitoring associated with various regulatory oversight programs, such as RCRA and CERCLA, with the current monitoring program required by DOE Orders. In addition, the IEMP reduced off-site surveillance monitoring by DOE because of the historically low data results. All of these changes were made to streamline the use of monitoring resources by combining monitoring for remediation projects, decontamination, and demolition operations into one program. In 1997, as a result of the current changes outlined in the IEMP, Ohio EPA conducted most of the off-property environmental monitoring at Fernald. The

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on and off-site sampling efforts of Ohio EPA should provide a mechanism to observe potential impacts to the surrounding environment from remedial activities.

In 1997, Ohio EPA continued its independent and split sampling programs. Independent sampling allows Ohio to evaluate additional locations and analytical parameters, not currently monitored by DOE, and to respond to specific citizen requests. OFFO collected numerous independent samples in 1997 including surface water, private well water, soil, sediment, and air. Split sampling allows a comparison of data between Ohio EPA and Fernald. OFFO's split sampling schedule included collecting private well water and surface water on a quarterly basis, with additional surface water splits taken during particular rain events. Special sediment split samples were collected to check laboratory methods and produce was sampled during the fall. The Ohio Department of Health provided data validation for OFFO's sampling program. A discussion of sampling activities and results for each media is provided in Sections 3.1 through 3.6.

In addition to AIP sampling, Ohio EPA conducts environmental monitoring as a part of its ongoing regulatory oversight program. Funding for this monitoring is provided in the Cost Recovery Grant. This monitoring is aimed at evaluating and reducing the impacts of remedial actions on the environment. During 1997, three sampling events and one oversight project took place under this program. Ohio EPA will continue its efforts to monitor remediation at Fernald and expand on it as necessary to ensure remedial actions adequately protect the environment.

Summary data from Ohio EPA's sampling program are included in the Appendices of this report. More detailed information on sample results may be obtained by calling Ms. Donna Bohannon at (937) 285-6453.

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3.1 PRIVATE WELLS

Ohio EPA's AIP environmental monitoring program continued to monitor three private wells in 1997 for total uranium. OFFO split sampled these wells with DOE/Fluor Daniel Fernald. In addition to the AIP split sampling, OFFO independently sampled one private well (REQT3) at the request of a homeowner.

The 1997 private well sampling locations are shown on the off-site sampling map in Appendix B. Private well's BOK14, NKM12 and BKM13 are located down gradient of Fernald and within the uranium plume. The request, REQT3, is south of the site along the edge of the Great Miami River.

Private well water is analyzed for total uranium, the primary contaminant of concern



Ohio EPA and Fluor Daniel Fernald staff split sample ground water in the Fernald area.

at Fernald. The USEPA proposed drinking water standard for total uranium is 20 $\mu\text{g/l}$. The ground water final remediation level for total uranium at Fernald is also 20 $\mu\text{g/l}$. Local background for total uranium in ground water, as determined in the OU5 Remedial Investigation report

(October, 1994), ranges up to 3.1 $\mu\text{g/l}$. The highest total uranium concentration detected in the private wells during 1997 was 140 $\mu\text{g/l}$ found in well NKM12. The lowest total uranium concentration of 2.6 $\mu\text{g/l}$ was detected in well BOK14. Appendix C contains the private well sampling results for 1997.

DOE's Integrated Environmental Monitoring Program has been implemented since August of 1997. As a result, the routine private well monitoring involves quarterly

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sampling of private wells BOK14, BKM13, and NKM12. OFFO split samples these three wells with Fluor Daniel Fernald. These wells have historically shown some fluctuation in their levels of total uranium concentrations. This is mostly due to seasonal changes that occur in the water table. For example, over the last two years total uranium results from well NKM12 fluctuated between the four month time intervals. In addition, similarities in total uranium results occur during certain months of year such as January and October. Ultimately, quarterly monitoring will provide the information needed to confirm seasonal fluctuations and any contaminant migration resulting from cleanup activities.

Ohio EPA and DOE/Fluor Daniel Fernald's sampling results have consistently shown good agreement over the course of the AIP program. This is an indication of good quality control in sampling technique and laboratory analyses of the two organizations.

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3.2 SURFACE WATER

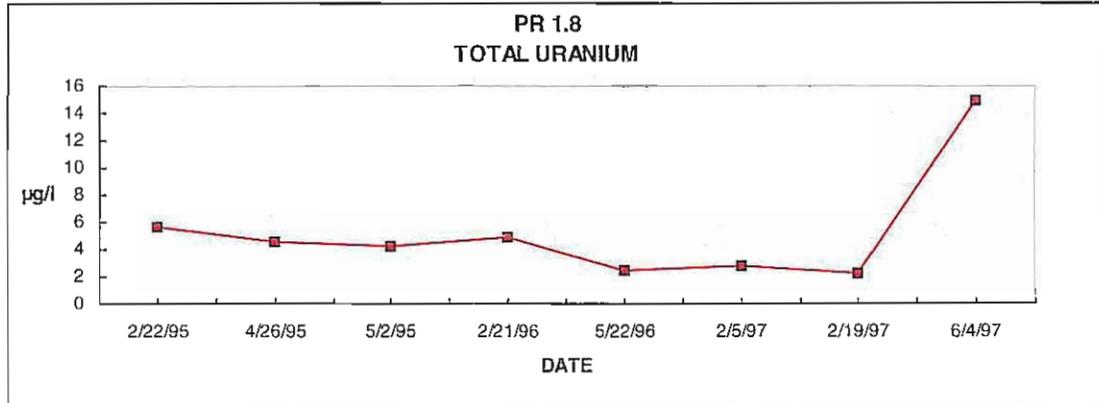
Routine monitoring continued quarterly for 1997. Thirty-five surface water samples were taken in 1997, compared with 37 taken in 1996. In addition to the routine monitoring in 1997, four samples were taken during a storm event on February 5. These samples were taken in the storm sewer outfall ditch, pilot plant drainage ditch, drainage from the temporary sediment basin east of the old haul road, and in Paddys Run at the south boundary. Samples were analyzed for total uranium, radium 226 and radium 228 (four samples from February 5 were analyzed for total uranium only).

The map in Appendix B shows all 1997 surface water sampling locations. Location codes reflect the river mile of the sampling location. GM26.2 and PR7.2 are background locations on the Great Miami River and Paddys Run respectively. PR3.4 is located on Paddys Run below the confluence of the drainage ditch that drains the site north of the production area. This location is also where the state threatened Sloan's crayfish is found. Location PR1.8 is at the Willey Road Bridge on Paddys Run off-site. This location is at the southern boundary of the site. PR0.2 is located at the Route 128 bridge and is fed primarily by ground water. Location GM24.6 is in the Great Miami River, directly downstream from Fernald's National Pollutant Discharge Elimination System outfall. Location GM21.4 is approximately three miles downstream of the outfall at the bridge in New Baltimore.

The final remediation levels (FRL) as established in the OU5 Record Of Decision, December 15, 1995 for total uranium, radium 226, and radium 228 in surface water in Paddys Run and the Great Miami River are 530 µg/l, 38 pCi/l, and 47 pCi/l, respectively. All sample results were below the final remediation levels, however, two background samples from the Great Miami River taken in November had higher than usual radium 228 results. Ohio EPA had these samples rerun by the contract laboratory. The results for the second analysis were slightly less than the original results and closer to the values seen historically at this location. Previously, samples taken in the pilot plant drainage ditch were likely to exceed the surface water FRL for

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total uranium. A sample taken on February 5, after installation of the sump on the pilot plant drainage ditch, contained 80 µg/l total uranium, far below the surface water FRL of 530 µg/l. Results are summarized in Appendix D.



The highest total uranium detection off-site was 15 µg/l at the Willey Road bridge (PR1.8). This is below the 20 µg/l proposed drinking water standard and far below the 530 µg/l surface water FRL. See figure above.

Fluor Daniel Fernald composites grab samples into a monthly composite for radium 226 and 228. Direct comparisons were not made between their radium 226 and 228 surface water data and Ohio EPA surface water data during 1997 for this reason. Comparisons with site surface water total uranium continued to show that their surface water values are similar to Ohio EPA results (Appendix D).

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3.3 SEDIMENT

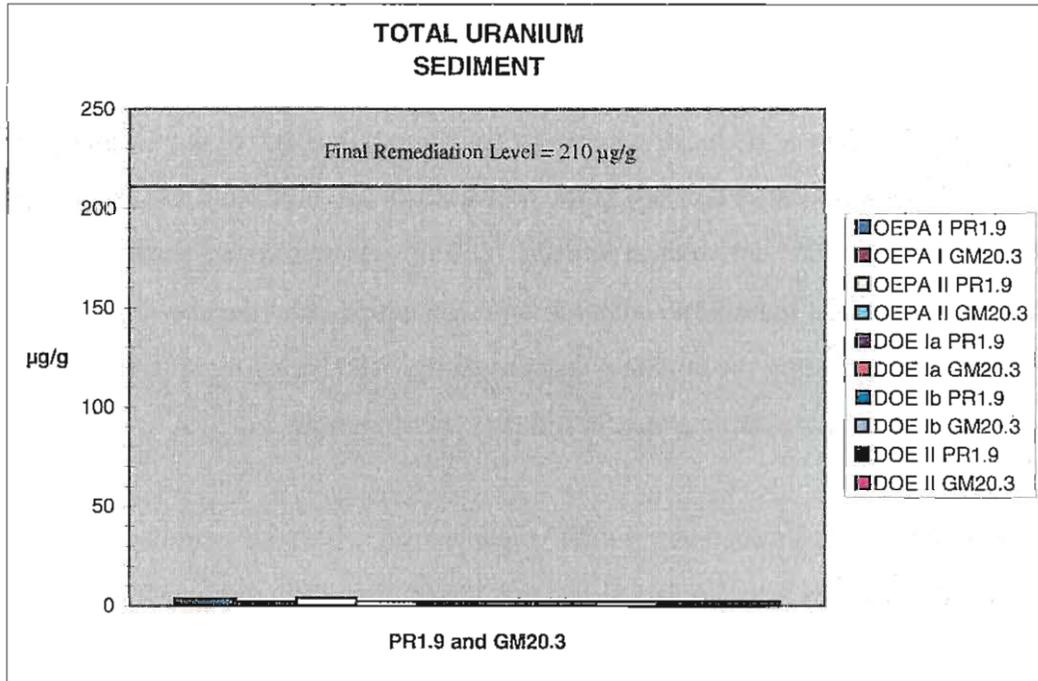
Six independent routine samples were collected in 1997. Four additional samples were collected from two locations. These additional samples were split samples collected with DOE/Fluor Daniel Fernald and taken to further examine the potential causes of the minor differences seen between Fluor Daniel Fernald total uranium sediment data and Ohio EPA data. A total of ten sediment samples were analyzed in 1997, increased from nine in 1996 and seven in 1995. Samples were analyzed for total uranium, radium 226, isotopic thorium, and cesium 137. Additionally, samples from Paddys Run were analyzed for the metals arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

The map in Appendix B shows all 1997 sediment sampling locations. The two locations split with DOE /Fluor Daniel Fernald were taken at the confluence of Paddys Run and the Great Miami River, and downstream of the confluence of the storm sewer outfall ditch in Paddys Run. Two independent samples were taken in the Great Miami River and four independent samples were taken along Paddys Run. Independent samples were co-located with surface water locations with the exception of the Paddys Run background sample. Location PR7.2 had a gravel and cobble substrate, and did not have sufficient sediment. PR4.6 at the Morgan Ross Road bridge, the DOE/Fluor Daniel Fernald background station, was sampled.

Final remediation levels for sediment at Fernald have been established for the following analytes (OU5 Record Of Decision, December 15, 1995): total uranium (210 $\mu\text{g/g}$); radium 226 (2.9 pCi/g); thorium 228 (3.2 pCi/g), 230 (18000 pCi/g), and 232 (1.6 pCi/g); cesium 137 (7 pCi/g); arsenic (94 mg/kg); cadmium (71 mg/kg); and chromium IV (3000 mg/kg). No sediment sample had any analyte above the final remediation level. Results are summarized in Appendix E.

Levels of total uranium in samples analyzed by Ohio EPA's contract laboratory have generally been higher than those analyzed by DOE/Fluor Daniel Fernald. The

laboratories used procedures that differed slightly in sample preparation. In 1997, split samples taken at locations PR1.9 and GM20.3 were analyzed using the methodologies outlined in Table 3 in Appendix E. Generally, Ohio EPA samples run using either method were slightly higher than reported by DOE/Fluor Daniel Fernald, even though the same methods were used. It should be noted that all of the values are small and do not approach the FRLs.



Considering the difficulty in sampling sufficient sediment to conduct split samples, the inherent variability of results from sediment samples, and the low levels of radionuclides in the sediments, further investigation of these minor differences in results will not be pursued.

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3.4 SOIL

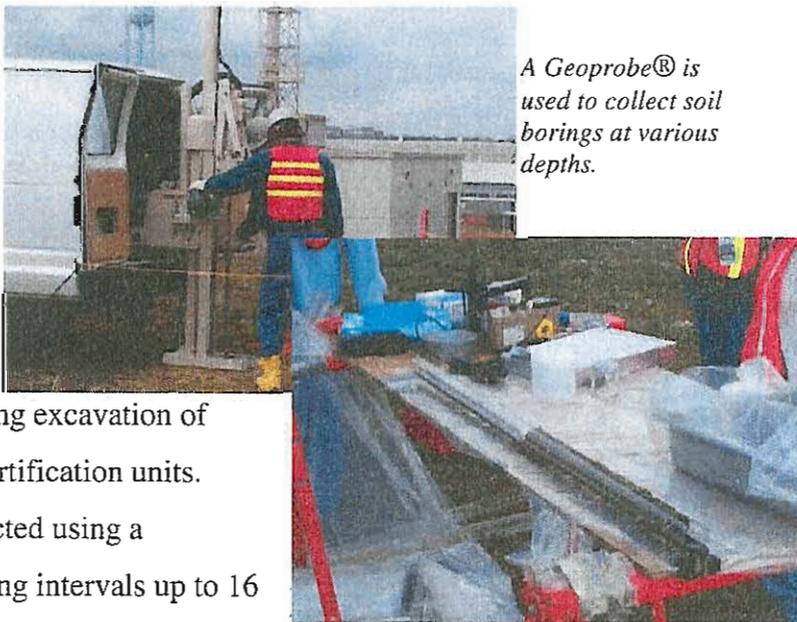
In 1997 under the AIP, Ohio EPA independently sampled soil next to OFFO's air monitoring stations at Fernald. This monitoring method evaluates airborne deposition in soil and possible impacts that may occur from remedial actions taking place at the site. Annual soil samples were collected near three air monitoring stations. One sample was collected from each of the two on-site locations and one from background. On-site air monitoring station, FNAPS01, is located near the waste pits. The second station, FNAPS02, is located on the eastern border of Fernald near the OSDF (see the on-site locations map in Appendix A). Both of the sampling points were selected because they are in the prevailing wind direction and located next to on-going construction activities at Fernald. OFFO's air monitoring stations have shown slight elevations in airborne contamination generated from the site's construction activities, including the on-site disposal facility. The background station, OHAPSBK, is located in Eaton, Ohio about 28 miles north of Fernald.

Soil samples collected under the AIP were analyzed for total uranium and other selected radionuclides, including radium 226, radium 228, thorium 228, thorium 230, and thorium 232. DOE's final remediation levels for on-site soil are 1.7 pCi/g for radium 226, 1.8 pCi/g for radium 228, 1.7 pCi/g for thorium 228, 280 pCi/g for thorium 230, and 1.5 pCi/g for thorium 232. As seen on Table 1 in Appendix F, all soil radium and thorium results are below on-site FRLs.

The analytical results help determine impacts from airborne contamination, ensure off-site properties are not being adversely affected, and allow tracking of historical trends. DOE's final remediation level for total uranium in most soil at Fernald is 80 $\mu\text{g/g}$, the ALARA (as low as reasonably achievable) level is 50 $\mu\text{g/g}$, and background varies from 2 to 7 $\mu\text{g/g}$. The highest total uranium soil concentration detected at OFFO's air monitoring station, FNAPS01, was 30 $\mu\text{g/g}$. Although this result is below the FRL and the ALARA goal, it is above background, which is consistent with past soil data. See Appendix F for data tables summarizing soil sampling results.

During 1997 under the CRG, Ohio EPA collected a total of 49 soil samples from four different areas at Fernald. Each sampling event had a specific compliance objective:

- The first five samples were splits collected from the Southern Waste Units in order to delineate soils above the waste acceptance criteria. The sample results (Appendix F Table 2) showed the soil was below the waste acceptance criteria and could be removed for disposal in the OSDF.
- The next soil investigation was conducted on the eastern stream bank of Paddy's Run. Due to erosion, the eastern stream bank of Paddy's Run, next to the K-65 Silos, had collapsed into the streambed. Split samples from the collapsed soil were necessary to obtain characterization data for total uranium and technetium-99. Samples were also analyzed for lead and chromium to determine whether RCRA waste materials were present in the soil. As seen in Appendix F Table 3, soil results illustrate that the soil concentrations were below the waste acceptance criteria. The results indicated that there were no RCRA wastes present in the soils, and the soil was acceptable for placement in the OSDF. However, one Ohio EPA soil sample had a radium 226 concentration of 30 pCi/g, well above the FRL of 1.7 pCi/g. This radium result is due to runoff from the K-65 Silos, and will be addressed at the time of silo remediation.
- In the third split sampling event, Ohio EPA and DOE collected 24 split samples from a soil stockpile that had been generated during excavation of Fernald's eastern certification units. Samples were collected using a Geoprobe® at varying intervals up to 16 feet deep in the stockpile and analyzed for total uranium and technetium-99. As



A Geoprobe® is used to collect soil borings at various depths.

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Appendix F Table 2 shows, they were well below the waste acceptance criteria and the stockpile was deemed suitable for disposal in the OSDF.

- The last soil sampling event in 1997 under the CRG, took place in the Northeast corner of Fernald's Production Area. This area needed further investigation to better characterize and define excavation limits and check for possible physical anomalies. DOE conducted the sampling using the Geoprobe®. Surface and subsurface soil cores were collected up to a maximum of 24 feet deep and analyzed for total uranium. Ohio EPA ran independent analysis for total uranium and technetium-99. Samples were from separate locations and different depth intervals, than DOE's. Appendix F Table 2 demonstrates soil results were below the waste acceptance criteria and soil could be placed in the OSDF.

In 1997, Ohio EPA and DOE/Fluor Daniel Fernald discontinued soil and grass split sampling in both of their environmental monitoring programs. The grass portion of the monitoring programs was dropped because results did not show a correlation between the two media. Uranium uptake in grass was not evident in past results. However, past soil results have proved to be a good source for detecting uranium deposition in soil. Ohio EPA will continue to independently monitor soil.

Ohio EPA will continue to work with DOE and Fluor Daniel Fernald in 1998 to monitor site soil conditions and evaluate WAC characterization areas prior to disposal in the OSDF.

3.5 PRODUCE

Produce sampling provides another method of monitoring impacts of airborne emissions generated from remedial activities and site operations. In 1997 OFFO continued to split produce samples under their AIP program. This year was the first for DOE to implement its IEMP, which includes a three-year cycle for produce sampling events. The new program does not include collocated soil samples with the produce. DOE's rationale remains that the historical data doesn't indicate a relationship between total uranium concentrations and the two media. Additionally, both soil and produce results have been within the background range. Ohio EPA plans to follow DOE's sampling procedure, therefore produce samples will be collected again in the year 2000.

Produce samples were collected from two vegetable gardens located downwind from Fernald which supply local produce stands. Appendix B is an off-site sampling map with the locations of the two sampling points. Corn samples were collected at BURWK53. Ears of corn were picked from several different plants growing in the same row and then divided into two individual samples. Tomato samples were collected at the second location, ATHERN54. Tomatoes were picked from several plants growing next to each other in the same row. The tomatoes were divided evenly for the individual split samples.

Total uranium is the parameter analyzed in produce. Total uranium concentrations in produce are consistent with the 1996 data. See Appendix G for 1997 produce data. The historical data reveals a steady pattern of very low total uranium concentrations in produce. However, due to continued public concern about uranium concentrations in local vegetables, samples will continue to be collected every three years.

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3.6 AIR

Ohio EPA conducts limited air monitoring and surveillance activities at Fernald. These activities include the operation of high volume air samplers for the collection of particulate samples and the operation of a radon monitor for the continuous monitoring of radon gas. A background station is also located near the City of Eaton. Ohio EPA air sampling activities are conducted primarily to verify the effectiveness of the existing DOE environmental air monitoring network. Air monitoring is also conducted to measure environmental impacts from remediation.

The primary radiological contaminants from Fernald found in the air pathway are uranium and radon. Other contaminants such as thorium and radium may become significant as remediation activities increase. Therefore, Ohio EPA sampled for total uranium, total suspended particulates (TSP), and radon-222 in 1997. Ohio EPA also analyzed an annual composite sample from each high volume sampling location for isotopic uranium, isotopic thorium, and radium-226.

Particulate contaminants such as uranium may enter the air pathway as fugitive dust through the resuspension of contaminated soils. Large areas of Fernald have been excavated and new construction is evident throughout the site. These activities allow for the resuspension of contaminated soils into the air, which may transport them off-site. Ohio EPA has high volume air samplers at select locations to measure the airborne concentration of total uranium and total suspended particulates.

Radon, a noble gas, enters the air pathway by diffusing through materials or soil. The primary source of radon at Fernald is the K-65 silos. The silos contain high concentrations of radium bearing wastes from former production activities. The radium in the silos decays to radon-222, which is continuously released from the silos into the ambient air. There are also other sources of radon at Fernald, which include the waste pits in the northwest portion of the facility. Ohio EPA uses a continuous radon monitor at the facility's west fenceline to measure the concentration of radon in

air leaving the facility.

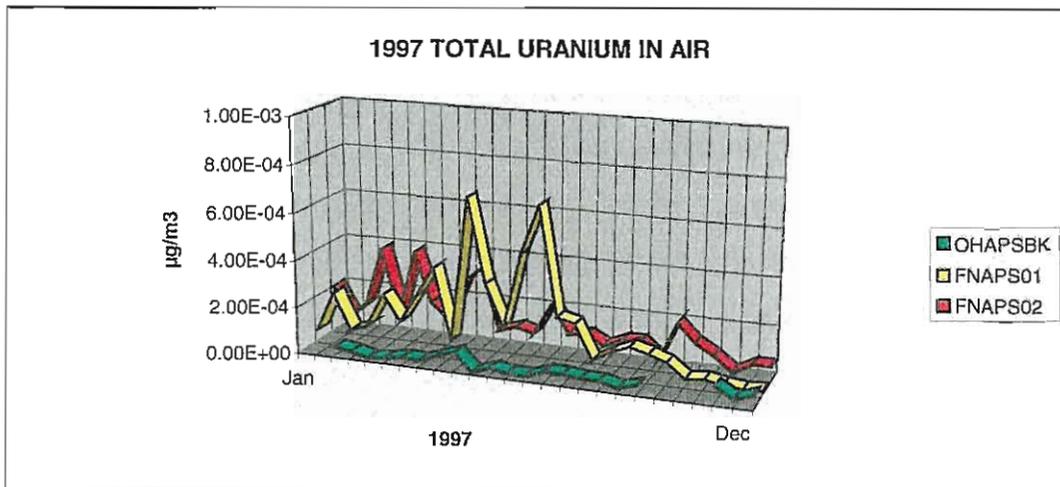
High Volume Air Sampling: Ohio EPA currently operates two high volume air samplers at Fernald, and a background sampler located in Eaton, OH. The locations are shown on the map in Appendix A. These locations were chosen based on the prevailing wind direction, availability of utilities, and points where maximum concentrations may be measured. High volume air sampling is conducted by continuously sampling air in the breathing zone. A filter is used to collect a particulate sample, which is analyzed every two weeks.

FNAPS01 is located northeast of the waste pit area. Data is evaluated over time and used to measure potential impacts from the remediation of the waste pit area. The second high volume air sampling location, FNAPS02 is operated along the northeast fenceline near the disposal facility. Ohio EPA samples at this location to monitor for potential off-site releases during OSDF construction and waste placement. A third location, FNAPS03, was operational from July, 1997 through December, 1997. It was located northeast of the storm water retention basins, south of the main parking lot. The location was to be used to monitor potential impacts from remediation activities in the south field. Close proximity to parking lot traffic caused interferences including excessively high filter loadings, which appeared to damage the sampler and caused Ohio EPA to discontinue sampling at this location. A background location (OHAPSBK) is operated in Eaton, Ohio which is approximately 28 miles north of Fernald. This sampler is located beyond the influence of any known radiological contaminant sources, and also serves as the background location for other OFFO air sampling activities.

Ohio EPA uranium in air concentrations are presented in Appendix H Table 1. The following figure displays the concentrations from FNAPS01, FNAPS02, and OHAPSBK. All of the concentrations were higher than the concentrations measured at the background location but the results were less than National Emission Standards

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for Hazardous Air Pollutants (NESHAP) for Radionuclides concentrations.



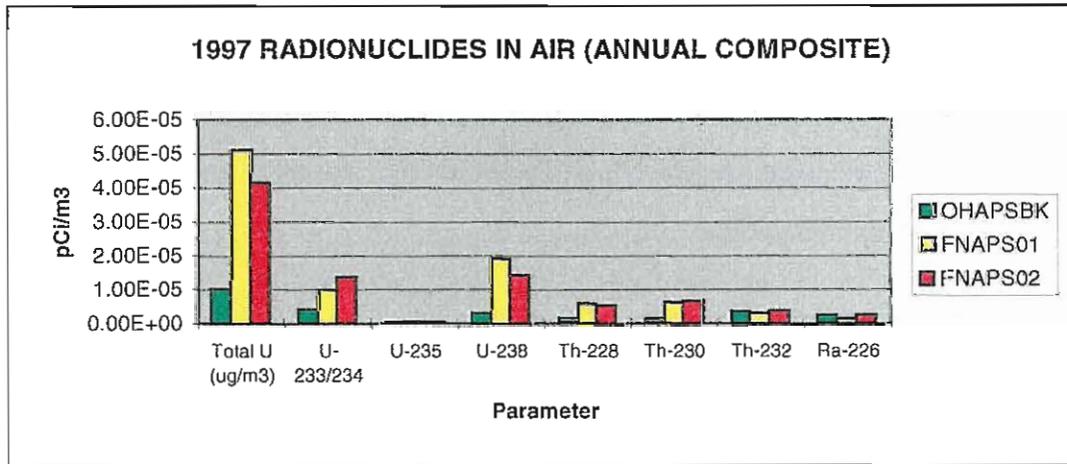
The average concentrations for FNAPS01 and FNAPS02 in 1997 were $1.87 \times 10^{-4} \mu\text{g}/\text{m}^3$ and $1.47 \times 10^{-4} \mu\text{g}/\text{m}^3$ respectively. These averages were slightly less than the average concentrations measured in 1996 and are within historical ranges reported by DOE from 1993 to 1995. The maximum concentration, $6.87 \times 10^{-4} \mu\text{g}/\text{m}^3$ was measured at FNAPS01 from May 6 to May 20, 1997. This result is consistent with the conditions present at Fernald during this sampling period: little rainfall amid construction activities at OU1. Uranium concentrations decreased during September until the end of the year reflecting diminishing construction activities and increased rainfall.

The results from FNAPS03 are presented in Appendix H Table 1 and 2. The measured concentrations of total uranium and total suspended particulates were elevated compared to the other sampling locations. The location of this sampler was determined to be too close to the road causing interference from traffic. The purpose of this sampler was to monitor impacts from the south field remediation activities. The results do indicate that increased fugitive emissions lead to increased uranium concentrations in air. No conclusions can be made about south field remediation impacts on air quality from sampling at this location.

Ohio EPA has proposed a new location for this air sampler which should be installed

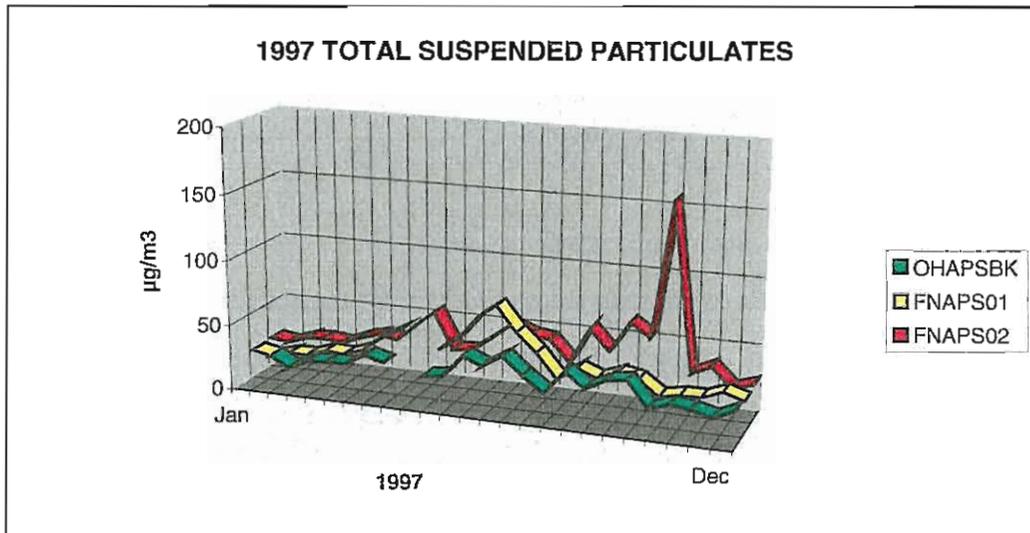
and operational in early 1998. The new location will be near the meteorological tower. The results from this location should be useful in determining impacts on air quality from the south field remediation.

An annual composite from each sampling location was analyzed for the following parameters: total uranium, isotopic uranium, isotopic thorium and radium-226. The results are presented in Appendix H Table 1, and in the figure below. The uranium results from samplers located at Fernald were all elevated compared to the background location, which is consistent with the bi-weekly sample results. Thorium-228 and thorium-230 concentrations were also elevated compared to the background location. The thorium-232 and radium-226 results were comparable to background concentrations. Again, all of the measured concentrations were less than National Emission Standards for Hazardous Air Pollutants (NESHAP) for Radionuclides concentrations.



Total suspended particulate (TSP) measurements are presented in Appendix H Table 2 and in the following figure. The results increase during the summer months, during periods of low rainfall and tend to remain fairly constant throughout the rest of the year. The TSP measurements from FNAPS02 do not follow this trend during the last quarter of the year. A measurement of 157 mg/m³ was measured from October 21 to November 4, 1997. This elevated measurement appears to be due to increased fugitive dust emission from the use of a helicopter to dry the clay liner of the OSDF.

ENVIRONMENTAL MONITORING



TSP measurements have been compared to total uranium measurements from the same sample. Although a general trend between the two measurements can be observed a statistically valid correlation cannot be established.

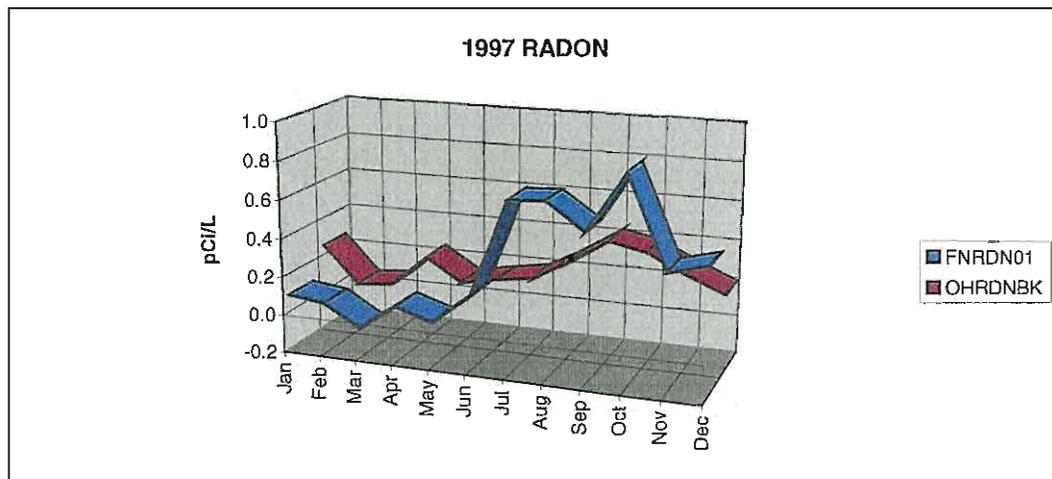
Ohio EPA will be operating two additional high volume samplers at local elementary schools in 1998. Although the remediation of Fernald is not likely to impact the air quality at these locations, the Ohio EPA would like to continue these historically DOE monitored locations.

Data quality for the high volume air samplers is assured through quarterly calibration and independent audits of the air flow rate, as well as independent data validation of laboratory results.

Radon Sampling: Ohio EPA collects continuous, real-time measurements through the use of alpha scintillation detectors. The concentrations are averaged and recorded hourly. The hourly data is stored electronically within the monitor and remotely at Ohio EPA's Southwest District Office in Dayton. The most recent hourly data from our sampling locations can be viewed from the OFFO Internet web site at <http://offo2.epa.state.oh.us/frealtime.htm>.

ENVIRONMENTAL MONITORING

Ohio EPA conducts radon sampling at location FNRDN01 which is located west of the K-65 silos along Paddy's Run Road (see map in Appendix A). This location was chosen based on its proximity to the silos. Ohio plans to install an additional radon sampler at Fernald, east of the silos near the Advanced Waste Water Treatment facility. Ohio EPA also operates a radon monitor, OHRDNBK, at the background location in Eaton, Ohio. The radon monitoring results for FNRDN01 and OHRDNBK are shown in Appendix H Table 3. The data indicates that average monthly radon concentrations at FNRDN01 are all less than 1 pCi/L, and are well below the DOE Order 5400.5 limit of 3.0 pCi/L annual average at the facility fence line.



Ohio EPA has compared the results from FNRDN01 to the results from the background location, OHRDNBK, in the figure above. The data from both locations are comparable from January through June. Beginning in July, the concentrations from FNRDN01 appear to be higher than the concentrations at OHRDNBK. This apparent increase in radon concentration will be watched carefully during 1998.

Although the background concentrations measured by Ohio EPA are within the ranges to be expected for ambient environmental radon concentrations, they may not be typical for the Hamilton County/Butler County area. Ohio EPA will investigate the appropriateness of the current background location in Eaton and make any appropriate changes.

ENVIRONMENTAL MONITORING

Data quality is assured through annual calibration of radon sampling equipment and monthly source checks. Data retention for Ohio EPA radon monitors was greater than 90% for both sampling locations in 1997. This is a significant increase from the fourth quarter of 1996. Ohio EPA has set a minimum goal of 95% data retention for each sampling location in 1998.

APPENDICES

Appendix A - On-Site Sampling Locations Map

Appendix B - Off-Site Sampling Locations Map

Appendix C - Private Wells Data Table

Appendix D - Surface Water Data Table

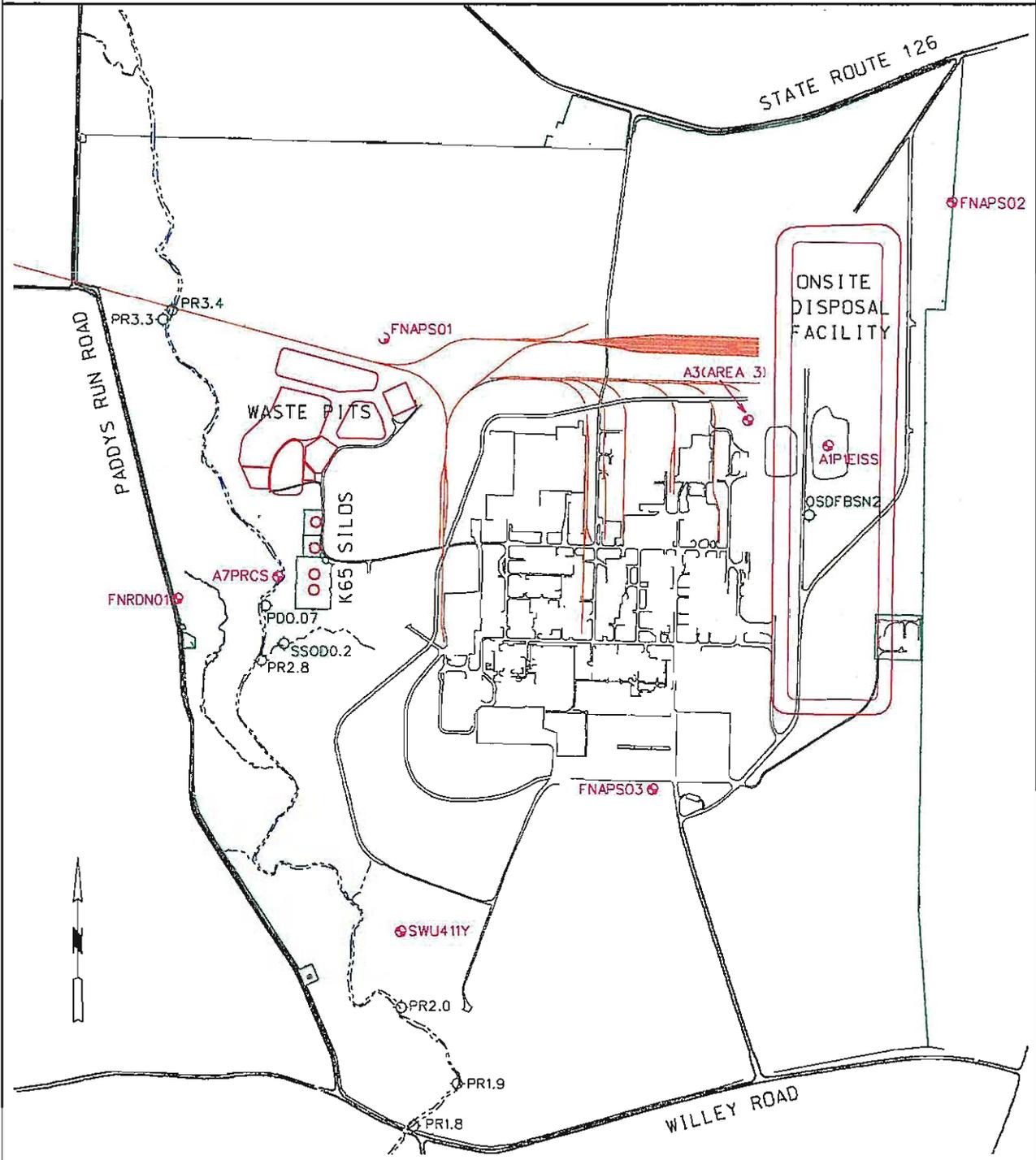
Appendix E - Sediment Data Tables and Laboratory Methods

Appendix F - Soil Data Tables

Appendix G - Produce Data Table

Appendix H - Air Monitoring Data Tables

1997 OHIO EPA ON-SITE SAMPLING LOCATIONS



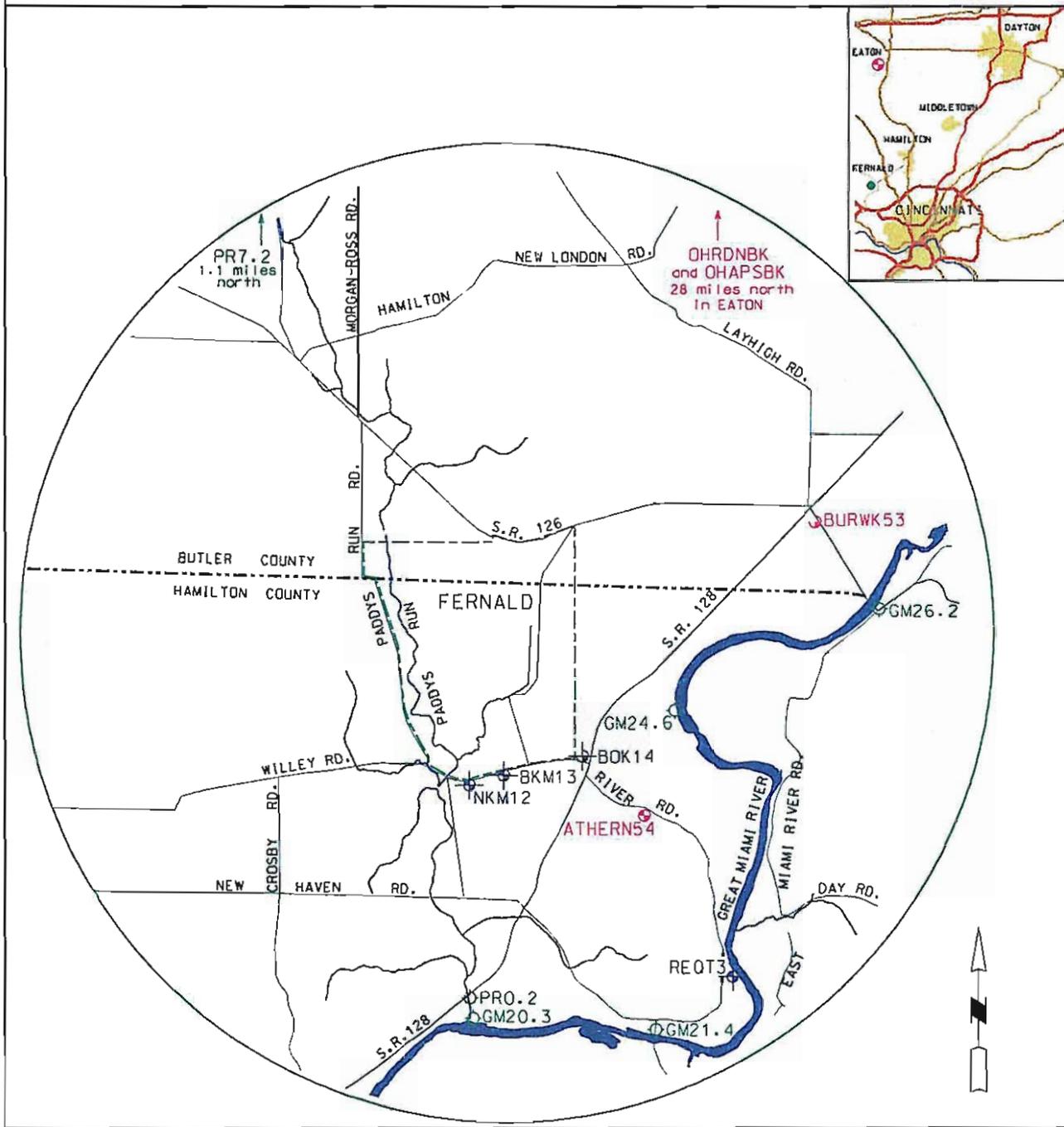
PROJECTION: STATE PLANE
 ZONE: OHIO SOUTH
 UNITS: FEET
 DATUM: NAD 27
 C:/PROJECTS/BILL/FERNALD/ANNLRPT97.DGN



OhioEPA
 OFFICE OF FEDERAL FACILITIES OVERSIGHT

LEGEND	
	FERNALD FENCELINE
	PADDY'S RUN AND TRIBUTARIES
	RAILROAD
	SURFACE WATER/SEDIMENT LOCATION
	PRODUCE/AIR/SOIL LOCATION

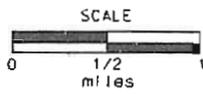
1997 OHIO EPA OFF-SITE SAMPLING LOCATIONS



PROJECTION: STATE PLANE
 ZONE: OHIO SOUTH
 UNITS: FEET
 DATUM: NAD 27
 G:\PROJECTS\BILL\FERNALD\LANDUSE.DGN



OFFICE OF FEDERAL FACILITIES OVERSIGHT



LEGEND	
---	COUNTY LINE
---	FERNALD PROPERTY BOUNDARY
+	PRIVATE WELL LOCATION
○	SURFACE WATER/SEDIMENT LOCATION
●	PRODUCE/AIR/SOIL LOCATION

TABLE 1

PRIVATE WELLS			
LOCATION CODE	COLLECT DATE 1997	OEPA TOTAL U $\mu\text{g/l}$	DOE TOTAL U $\mu\text{g/l}$
BKM13	Jan 22	49	40
BKM13	Apr 23	43	43
BKM13	Jul 23	42*	61
BKM13	Oct 29	38	59
BOK14	Jan 22	3.2	2.8
BOK14	Apr 23	2.9	2.7
BOK14	Jul 23	3.3*	3.2
BOK14	Oct 29	2.6	3.1
NKM12	Jan 22	130	119
NKM12	Apr 23	140	141
NKM12	Jul 23	95*	100
NKM12	Oct 29	93	103
REQT3	May 25	0.95	NS

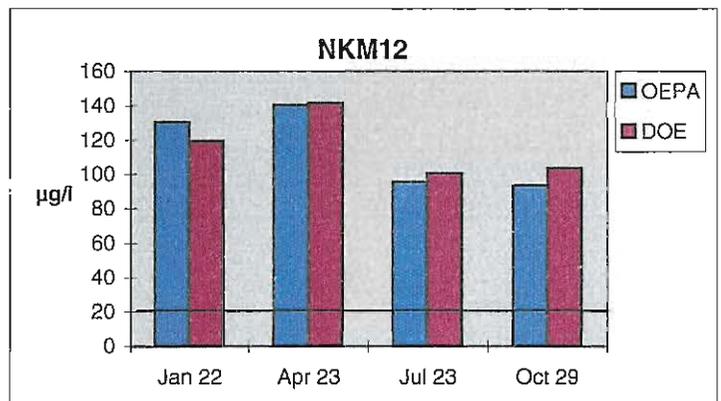
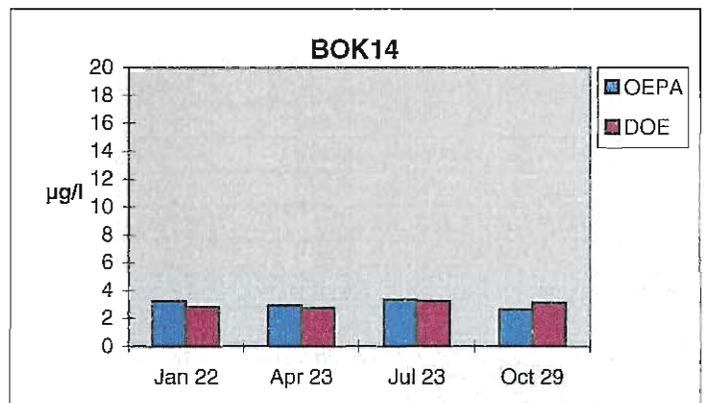
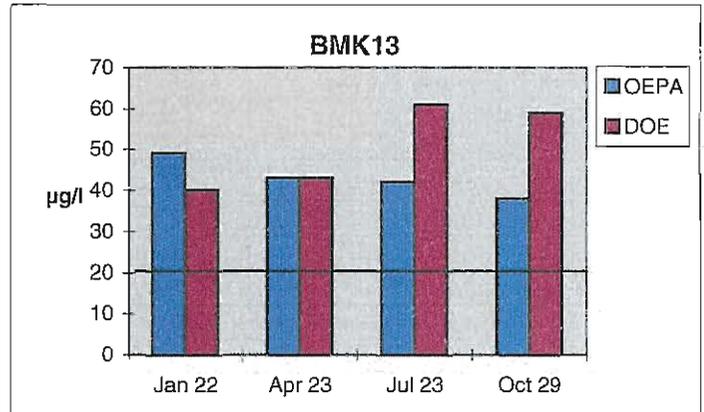
Note:

Total Uranium Final Remediation Level =
20 $\mu\text{g/l}$ for ground water

$\mu\text{g/l}$ = micrograms per liter

* = Estimated - these results have been J-qualified or estimated; this means a result is more uncertain (less precise and/or less accurate) than would normally be expected for the analyte given the method and level of the result.

NS = Not sampled



APPENDIX D

TABLE - 1

SURFACE WATER								
LOCATION ID	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA TU µg/l	DOE TU µg/l	OEPA Ra 226 pCi/l	OEPA Ra 226 +/- error	OEPA Ra 228 pCi/l	OEPA Ra 228 +/- error
GM21.4	New Baltimore Bridge	Feb 19	1.9	1.7	<0.15	0.094	2.3	0.75
GM21.4	New Baltimore Bridge	Jun 4	1.0	1	0.44	0.075	2.8	0.72
GM21.4	New Baltimore Bridge	Aug 27	1.3		0.12	0.049	2.2	0.51
GM21.4	New Baltimore Bridge	Nov 26	1.4		0.25	0.055	2.2	0.66
GM24.6	Down Stream FEMP Effluent	Feb 19	1.9		0.18	0.11	2.5	0.77
GM24.6	Down Stream FEMP Effluent	Aug 27	1.6		0.18	0.047	2.2	0.52
GM24.6	Down Stream FEMP Effluent	Nov 26	1.5		0.12	0.046	2.2	0.64
GM26.2	Venice Bridge - background	Feb 19	1.9		<0.15	0.097	2.3	0.74
GM26.2	Venice Bridge - background	Aug 27	1.5		0.38	0.074	2.6	0.57
GM26.2	Venice Bridge - background	Nov 26	1.4		0.25	0.057	5.6	1.3
PD0.7	Paddys Run drainage ditch	Feb 5	80		NA		NA	
PR0.2	Paddys Run/Mile 0.2	Feb 19	2.9		<0.13	0.084	2.0	0.73
PR0.2	Paddys Run/Mile 0.2	Aug 27	8.8		<0.12	0.072	4.4	0.82
PR0.2	Paddys Run/Mile 0.2	Nov 26	4.4		<0.054	0.054	2.5	0.6
PR1.8	Paddys Run/Willey Brdg	Feb 5	2.8		NA		NA	
PR1.8	Paddys Run/Willey Brdg	Feb 19	2.2	2	<0.17	0.096	2.5	0.75
PR1.8	Paddys Run/Willey Brdg	Jun 4	15	18	0.56	0.1	1.9	0.6
PR2.0	Paddys Run/South Fld	Feb 19	2.2	2.1	<0.21	0.13	1.8	0.65
PR2.0	Paddys Run/South Fld	Jun 4	18	17	0.71	0.11	1.8	0.56
PR2.8	Paddys Run/Dwn Stream	Feb 19	6.2	6.1	<0.13	0.085	2.8	0.78
PR2.8	Paddys Run/Dwn Stream	Jun 4	6.3		0.30	0.054	3.6	0.82
PR3.3	Paddys Run - down stream	Nov 26	2.1		<0.059	0.059	2.3	0.56
PR3.4	Paddys Run/RR Bridge	Feb 19	1.6	1.6	0.18	0.088	2.2	0.74
PR3.4	Paddys Run/RR Bridge	Jun 4	1.4	1.4	0.27	0.053	0.86	0.48
PR3.4	Paddys Run/RR Bridge	Aug 27	1.2		0.12	0.049	2.0	0.51
PR7.2	Paddys Run - background	Feb 19	1.5		<0.15	0.089	2.1	0.72
PR7.2	Paddys Run - background	Aug 27	0.58		<0.067	0.042	2.1	0.5
PR7.2	Paddys Run - background	Nov 26	0.64		<0.04	0.04	1.5	0.47
OSDFBSN2	Disposal Facility basin 2 - OSDF	Feb 5	33		NA		NA	
SSOD0.2	Storm sewer outfall ditch	Feb 5	20		NA		NA	

NOTE:

µg/l = micrograms per liter

pCi/l = picocuries per liter

Total Uranium Final Remediation Level = 530 µg/l for surface water

Ra-226 Final Remediation Level = 38 pCi/l for surface water

Ra-228 Final Remediation Level = 47pCi/l for surface water

NA = not analyzed

TABLE - 1

SEDIMENT - RADIONUCLIDES								
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA TOTAL U µg/g	OEPA Ra 226 pCi/g	OEPA Ra 226 +/- error	OEPA Ra 228 pCi/g	OEPA Ra 228 +/- error	OEPA Ra 228
PR1.9 - I	Near storm sewer outfall ditch (31 meters)	Jun 27	3.4*	0.49	0.15	<0.46	NA	
PR1.9 - II	Near storm sewer outfall ditch (31 meters)	Jun 27	4.1	0.69	0.23	0.98	0.5	
GM20.3 - I	GMR RM 20.3 - confluence PR & GMR	Jun 27	1.9*	0.59	0.16	<0.48	NA	
GM20.3 - II	GMR RM 20.3 - confluence PR & GMR	Jun 27	2.0	0.77	0.29	0.95	0.74	
GM24.6	Downstream of FEMP effluent	Jul 22	2.0*	0.82	0.32	<0.68	NA	
GM26.2	Venice Bridge - GMR River Mile 26.2	Jul 22	1.5*	0.35	0.17	0.40	0.28	
PR0.2	Rt. 128 bridge at Paddys Run	Jul 24	2.3*	0.50	0.13	0.44	0.27	
PR1.8	Willey Road Bridge	Jul 24	1.7*	0.42	0.13	0.26	0.27	
PR3.3	NW of FEMP, S. of RR bridge spanning PR	Jul 24	1.7*	0.34	0.12	0.40	0.21	
PR4.6	Morgan Ross Bridge	Jul 25	0.95*	0.27	0.17	0.28	0.31	

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Th 228 pCi/g	OEPA Th 228 +/- error	OEPA Th 230 pCi/g	OEPA Th 230 +/- error	OEPA Th232 pCi/g	OEPA Th232 +/- error
PR1.9 - I	Near storm sewer outfall ditch (31 meters)	Jun 27	0.63	0.087	0.94	0.12	0.58	0.08
PR1.9 - II	Near storm sewer outfall ditch (31 meters)	Jun 27	0.78	0.11	0.94	0.12	0.61	0.084
GM20.3 - I	GMR RM 20.3 - confluence PR & GMR	Jun 27	0.70	0.11	0.85	0.12	0.55	0.024
GM20.3 - II	GMR RM 20.3 - confluence PR & GMR	Jun 27	0.66	0.095	0.90	0.11	0.67	0.091
GM24.6	Downstream of FEMP effluent	Jul 22	0.62	0.083	0.88	0.11	0.51	0.071
GM26.2	Venice Bridge - GMR River Mile 26.2	Jul 22	0.68	0.095	0.71	0.097	0.69	0.095
PR0.2	Rt. 128 bridge at Paddys Run	Jul 24	0.74	0.097	1.3	0.16	0.72	0.094
PR1.8	Willey Road Bridge	Jul 24	0.48	0.072	0.70	0.094	0.44	0.067
PR3.3	NW of FEMP, S. of RR bridge spanning PR	Jul 24	0.75	0.11	0.64	0.095	0.71	0.10
PR4.6	Morgan Ross Bridge	Jul 25	0.66	0.088	0.80	0.1	0.62	0.082

Note:

µg/g = micrograms per gram

pCi/g = picocuries per gram

Total Uranium Final Remediation Level = 210 µg/l for sediment

NA = not applicable

* = Estimated - these results have been J-qualified or estimated; this means a result is more uncertain (less precise and/or less accurate) than would normally be expected for the analyte given the method and level of the result.

TABLE - 2

SEDIMENT - METALS								
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Arsenic mg/kg	OEPA Barium mg/kg	OEPA Cadmium mg/kg	OEPA Chromium mg/kg	OEPA Lead mg/kg	OEPA
PR0.2	Rt. 128 bridge at Paddys Run	Jul 24	3.9	43.1	<0.06	9.2	8.0	
PR1.8	Willey Road bridge	Jul 24	5.3	42.6	<0.06	14.6	11.0	
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	6.3	64.0	<0.06	12.6	10.7	
PR3.3	NW of FEMP, S. of RR bridge spanning PR	Jul 24	5.7	81.5	<0.06	17.5	11.1	
PR4.6	Morgan Ross Bridge	Jul 25	7.1	68.8	<0.06	15.6	16.5	

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Mercury mg/kg	OEPA Selenium mg/kg	OEPA Silver mg/kg
PR0.2	Rt. 128 bridge at Paddys Run	Jul 24	<0.01	<0.37	<0.17
PR1.8	Willey Road Bridge	Jul 24	<0.01	<0.38	<0.18
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	<0.01	<0.36	<0.17
PR3.3	NW of FEMP, S. of RR bridge spanning PR	Jul 24	<0.01	<0.37	<0.18
PR4.6	Morgan Ross Bridge	Jul 25	<0.01	<0.37	<0.17

Note:

mg/kg = milligrams per kilograms

APPENDIX E

TABLE - 3

SEDIMENT							
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA TOTAL U $\mu\text{g/g}$	OEPA TOTAL U $\mu\text{g/g}$	DOE TOTAL U $\mu\text{g/g}$	DOE TOTAL U $\mu\text{g/g}$	DOE TOTAL U $\mu\text{g/g}$
		FRL = 210 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	3.4*	4.1	1.59	2.09	1.67
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	1.9*	2	1.81	2.24	1.65

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Ra 226 pCi/g	OEPA Ra 226 pCi/g	DOE Ra 226 pCi/g	DOE Ra 226 pCi/g	DOE Ra 226 pCi/g
		FRL = 2.9 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	0.49	0.69	0.504	0.47	0.487
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	0.59	0.77	0.544	0.41	0.573

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Ra 228 pCi/g	OEPA Ra 228 pCi/g	DOE Ra 228 pCi/g	DOE Ra 228 pCi/g	DOE Ra 228 pCi/g
		FRL = 4.8 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	<0.46	0.98	NR	NR	NR
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	<0.48	0.95	NR	NR	NR

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Th 228 pCi/g	OEPA Th 228 pCi/g	DOE Th 228 pCi/g	DOE Th 228 pCi/g	DOE Th 228 pCi/g
		FRL = 3.2 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	0.63	0.78	0.351	0.34	0.361
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	1.9	0.66	0.422	0.4	0.374

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Th 230 pCi/g	OEPA Th 230 pCi/g	DOE Th 230 pCi/g	DOE Th 230 pCi/g	DOE Th 230 pCi/g
		FRL = 18,000 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	0.94	0.94	0.846	0.54	0.56
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	0.59	0.9	0.612	0.59	0.679

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA Th 232 pCi/g	OEPA Th 232 pCi/g	DOE Th 232 pCi/g	DOE Th 232 pCi/g	DOE Th 232 pCi/g
		FRL = 1.6 pCi/g	METHOD I	METHOD II	METHOD Ia	METHOD Ib	METHOD II
PR1.9	Near storm sewer outfall ditch (31 meters)	Jun 27	0.58	0.61	0.335	0.34	0.331
GM20.3	GMR RM 20.3 - confluence PR & GMR	Jun 27	<0.48	0.67	0.347	0.38	0.373

Note:
 SEDIMENT SPLIT SAMPLE LABORATORY METHODS:
 METHOD I - Historically used by Ohio EPA contract laboratory.
 METHOD Ia - Historically used by Ohio EPA contract laboratory and run by DOE off site laboratory.
 METHOD Ib - Historically used by Ohio EPA contract laboratory and run by DOE on site laboratory.
 METHOD II - Historically used by DOE laboratory.

$\mu\text{g/g}$ = micrograms per gram
 pCi/g = picocuries per gram
 NR = not reported

* = Estimated - these results have been J-qualified or estimated; this means a result is more uncertain (less precise and/or less accurate) than would normally be expected for the analyte given the method and level of the result.

TABLE - 1

SOIL - AIP							
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997.00	OEPA TOTAL U $\mu\text{g/g}$	OEPA Ra 226 pCi/g	OEPA Ra 226 +/- error	OEPA Ra 228 pCi/g	OEPA Ra 228 +/- error
FNAPS01	Air monitor - NE of waste pits	Sep 23	30	1.1	0.26	0.82	0.40
FNAPS02	Air monitor - E fence line	Sep 23	5.4	1.1	0.25	0.79	0.44
OHAPSBK	Air monitor - Eaton	Sep 23	2.5	1.6	0.35	1.3	0.52

LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997.00	OEPA Th 228 pCi/g	OEPA Th 228 +/- error	OEPA Th 230 pCi/g	OEPA Th 230 +/- error	OEPA Th232 pCi/g	OEPA Th232 +/- error
FNAPS01	Air monitor - NE of waste pits	Sep 23	0.79	0.18	2.0	0.31	0.90	0.18
FNAPS02	Air monitor - E fence line	Sep 23	1.2	0.15	1.5	0.17	1.3	0.16
OHAPSBK	Air monitor - Eaton	Sep 23	0.83	0.11	1.6	0.19	0.82	0.11

Note: $\mu\text{g/g}$ = micrograms per gram

pCi/g = picocuries per gram

Total Uranium Final Remediation Level = 80 $\mu\text{g/g}$ for soil

Ra 226 Final Remediation Level = 1.7 pCi/g for soil

Ra 228 Final Remediation Level = 1.8 pCi/g for soil.

Th 228 Final Remediation Level = 1.7 pCi/g for soil

Th 230 Final Remediation Level = 280 pCi/g for soil

Th 232 Final Remediation Level = 1.5 pCi/g for soil

APPENDIX F

TABLE - 2

SOIL - WAC SAMPLES					
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	OEPA TOTAL U $\mu\text{g/g}$	OEPA Tc99 pCi/g	OEPA Tc99 +/- error
SWU411Y	Southern Waste Unit	Aug 25	2.7	<0.82	NA
SWU411Y	Southern Waste Unit	Aug 25	1.6	<0.75	NA
SWU411Y	Southern Waste Unit	Aug 25	3.1	<0.79	NA
SWU411Y	Southern Waste Unit	Aug 25	1.3	<0.73	NA
SWU411Y	Southern Waste Unit	Aug 25	180	NS	NA
A1P1EISS-A1R	Area 1 Phase 1 East Stock Pile	Oct 27	30	0.62	0.31
A1P1EISS-A2R	Area 1 Phase 1 East Stock Pile	Oct 27	26	0.62	0.30
A1P1EISS-A3R	Area 1 Phase 1 East Stock Pile	Oct 27	16	0.57	0.30
A1P1EISS-A4R	Area 1 Phase 1 East Stock Pile	Oct 27	13	<0.47	NA
A1P1EISS-B1R	Area 1 Phase 1 East Stock Pile	Oct 27	22	0.7	0.31
A1P1EISS-B2R	Area 1 Phase 1 East Stock Pile	Oct 27	25	0.56	0.30
A1P1EISS-B3R	Area 1 Phase 1 East Stock Pile	Oct 27	15	0.62	0.30
A1P1EISS-B4R	Area 1 Phase 1 East Stock Pile	Oct 27	44	1.2	0.37
A1P1EISS-C1R	Area 1 Phase 1 East Stock Pile	Oct 27	26	0.66	0.30
A1P1EISS-C2R	Area 1 Phase 1 East Stock Pile	Oct 27	19	<0.56	NA
A1P1EISS-C3R	Area 1 Phase 1 East Stock Pile	Oct 27	18	<0.52	NA
A1P1EISS-C4R	Area 1 Phase 1 East Stock Pile	Oct 27	17	<0.51	NA
A1P1EISS-D1R	Area 1 Phase 1 East Stock Pile	Oct 27	20	<0.51	NA
A1P1EISS-D2R	Area 1 Phase 1 East Stock Pile	Oct 27	18	<0.51	NA
A1P1EISS-D3R	Area 1 Phase 1 East Stock Pile	Oct 27	13	<0.50	NA
A1P1EISS-D4R	Area 1 Phase 1 East Stock Pile	Oct 27	32	<0.51	NA
A1P1EISS-E1R	Area 1 Phase 1 East Stock Pile	Oct 27	18	<0.52	NA
A1P1EISS-E2R	Area 1 Phase 1 East Stock Pile	Oct 27	17	<0.51	NA
A1P1EISS-E3R	Area 1 Phase 1 East Stock Pile	Oct 27	15	<0.51	NA
A1P1EISS-E4R	Area 1 Phase 1 East Stock Pile	Oct 27	3.5	<0.52	NA
A1P1EISS-F1R	Area 1 Phase 1 East Stock Pile	Oct 27	13	<0.50	NA
A1P1EISS-F2R	Area 1 Phase 1 East Stock Pile	Oct 27	9.7	<0.53	NA
A1P1EISS-F3R	Area 1 Phase 1 East Stock Pile	Oct 27	11	<0.53	NA
A1P1EISS-F4R	Area 1 Phase 1 East Stock Pile	Oct 27	32	0.63	0.35
A3-12247-9	Area 3 NE Corner of Production	Dec 16	2.5	<0.38	NA
A3-12247-10	Area 3 NE Corner of Production	Dec 16	2.4	<0.37	NA
A3-12247-14	Area 3 NE Corner of Production	Dec 16	2.3	<0.38	NA
A3-12247-15	Area 3 NE Corner of Production	Dec 16	2.2	<0.38	NA
A3-12248-9	Area 3 NE Corner of Production	Dec 17	2.2	<0.38	NA
A3-12248-10	Area 3 NE Corner of Production	Dec 17	2.1	<0.38	NA
A3-12248-14	Area 3 NE Corner of Production	Dec 17	2.1	<0.40	NA
A3-12248-15	Area 3 NE Corner of Production	Dec 17	2.1	<0.40	NA
A3-12246-9	Area 3 NE Corner of Production	Dec 23	1.2	<0.41	NA
A3-12246-10	Area 3 NE Corner of Production	Dec 23	2.2	<0.41	NA
A3-12246-14	Area 3 NE Corner of Production	Dec 23	2.2	<0.38	NA
A3-12246-15	Area 3 NE Corner of Production	Dec 23	2.3	<0.40	NA
A3-12245-9	Area 3 NE Corner of Production	Dec 29	2.4	<0.41	NA
A3-12245-10	Area 3 NE Corner of Production	Dec 29	2.1	<0.37	NA
A3-12245-14	Area 3 NE Corner of Production	Dec 29	2.1	<0.38	NA
A3-12245-15	Area 3 NE Corner of Production	Dec 29	1.9	<0.37	NA

Note:

$\mu\text{g/g}$ = micrograms per gram

pCi/g = picocuries per gram

Total Uranium Waste Acceptance Criteria = 1030 $\mu\text{g/g}$ for soil

Technetium 99 Waste Acceptance Criteria = 29.1 pCi/g for soil

NS = no sample or sample not analyzed for parameter

NA = not applicable

TABLE - 3

SOIL - PADDYS RUN COLLAPSED SOIL								
LOCATION CODE	COLLECT DATE 1997	OEPA TOTAL U $\mu\text{g/g}$	OEPA Tc99 pCi/g	OEPA Tc99 +/- error	OEPA Ra226 pCi/g	OEPA Ra226 +/- error	OEPA Ra228 pCi/g	OEPA Ra228 +/- error
A7PRCS-2-2-R	Oct 22	2.7	0.22	0.24	NS		NS	
A7PRCS-8-2-R	Oct 22	14	0.28	0.23	NS		NS	
A7PRCS-16-2-R	Oct 22	2.5	0.23	0.22	NS		NS	
A7PRCS-12-2-R	Oct 22	NS	NS		30	2	<0.71	NA

Note:

$\mu\text{g/g}$ = micrograms per gram

pCi/g = picocuries per gram

Total Uranium Waste Acceptance Criteria = 1030 $\mu\text{g/g}$ for soil

Technetium 99 Waste Acceptance Criteria = 29.1 pCi/g for soil

NS = no sample or sample not analyzed for parameter

NA = not applicable

APPENDIX G

TABLE 1

PRODUCE					
LOCATION CODE	LOCATION DESCRIPTION	COLLECT DATE 1997	MATRIX	OEPA TOTAL U µg/g	DOE TOTAL U µg/g
BURWK53	RT. 126	Aug 28	CORN	0.305	0.0026
ATHERN54	RIVER ROAD	Aug 28	TOMATOES	0.554	0.088

Note:

µg/g = micrograms per gram

TABLE - 1

AIR - TOTAL URANIUM					
Analysis #	Month	OHAPSBK $\mu\text{g}/\text{m}^3$	FNAPS01 $\mu\text{g}/\text{m}^3$	FNAPS02 $\mu\text{g}/\text{m}^3$	FNAPS03 $\mu\text{g}/\text{m}^3$
1	Jan	NS	5.11E-05	2.01E-04	NS
2	Jan	NS	2.20E-04	7.39E-05	NS
3	Jan	3.74E-05	6.48E-05	1.36E-04	NS
4	Feb	2.60E-05	9.25E-05	3.85E-04	NS
5	Feb	7.12E-06	2.37E-04	1.06E-04	NS
6	Mar	1.68E-05	1.27E-04	3.87E-04	NS
7	Mar	2.77E-05	2.48E-04	1.72E-04	NS
8	Apr	2.50E-05	3.75E-04	1.08E-04	NS
9	Apr	5.30E-05	7.40E-05	2.88E-04	NS
10	May	7.51E-05	6.87E-04	3.51E-04	NS
11	May	2.28E-06	3.32E-04	8.48E-05	NS
12	Jun	2.97E-05	1.57E-04	1.08E-04	NS
13	Jun	1.77E-05	4.73E-04	8.77E-05	NS
14	Jul	1.50E-05	6.80E-04	2.24E-04	NS
15	Jul	4.22E-05	2.22E-04	1.03E-04	1.97E-03
16	Jul	4.22E-05	2.03E-04	1.11E-04	4.75E-04
17 *	Aug	3.37E-05	6.02E-05	7.03E-05	5.42E-04
18 *	Aug	3.37E-05	1.04E-04	1.05E-04	8.35E-04
19	Sep	1.41E-05	1.35E-04	1.07E-04	1.03E-03
20	Sep	3.51E-05	1.13E-04	4.47E-05	1.14E-05
21	Oct	9.61E-04	8.86E-05	2.03E-04	4.10E-04
22	Oct	6.10E-05	2.92E-05	1.27E-04	3.92E-05
23	Nov	9.17E-04	3.75E-05	8.25E-05	1.32E-03
24	Nov	7.18E-05	2.35E-05	2.28E-05	3.23E-05
25	Dec	2.62E-05	1.52E-05	6.42E-05	2.80E-04
26	Dec	5.43E-05	1.83E-05	6.70E-05	NS

ANNUAL COMPOSITE				
Analyte	OHAPSBK	FNAPS01	FNAPS02	FNAPS03
Total U ($\mu\text{g}/\text{m}^3$)	1.03E-05	5.10E-05	4.16E-05	2.25E-04
U-233/234 (pCi/m ³)	4.27E-06	1.00E-05	1.37E-05	5.19E-05
U-235 (pCi/m ³)	2.73E-07	5.26E-07	5.06E-07	1.87E-06
U-238 (pCi/m ³)	3.08E-06	1.91E-05	1.43E-05	5.19E-05
Th-228 (pCi/m ³)	1.52E-06	5.90E-06	5.35E-06	1.21E-05
Th-230 (pCi/m ³)	1.38E-06	6.38E-06	6.69E-06	2.14E-05
Th-232 (pCi/m ³)	3.59E-06	3.19E-06	3.87E-06	1.28E-05
Ra-226 (pCi/m ³)	2.56E-06	1.53E-06	2.68E-06	1.52E-05

Note:

* = Sample was inadvertently composited for total uranium analysis.

NS = Not Sampled

 $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

APPENDIX H

TABLE - 2

AIR - TOTAL SUSPENDED PARTICULATES					
Analysis #	Month	OHAPSBK µg/m³	FNAPS01 µg/m³	FNAPS02 µg/m³	FNAPS03 µg/m³
1	Jan	NS	20	21	NS
2	Jan	NS	17	19	NS
3	Jan	28	21	24	NS
4	Feb	20	21	25	NS
5	Feb	27	26	23	NS
6	Mar	28	25	29	NS
7	Mar	28	30	33	NS
8	Apr	37	41	31	NS
9	Apr	33	49	44	NS
10	May	NA	NA	56	NS
11	May	26	37	28	NS
12	Jun	28	47	29	NS
13	Jun	45	65	40	NS
14	Jul	39	76	52	NS
15	Jul	48	57	46	97
16	Jul	35	43	44	81
17	Aug	24	25	28	99
18	Aug	42	35	56	138
19	Sep	31	29	40	199
20	Sep	39	35	64	241
21	Oct	41	32	54	328
22	Oct	22	21	157	152
23	Nov	27	24	30	235
24	Nov	25	24	37	112
25	Dec	21	30	22	80
26	Dec	28	25	27	NS

Note:

NS = Not Sampled

NA = Not Analyzed

µg/m³ = micrograms per cubic meter

TABLE - 3

AIR - RADON												
FNRDN01-1997	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average of Conc. (pCi/l)	0.1	0.1	0.0	0.1	0.0	0.2	0.7	0.7	0.6	0.9	0.4	0.5
Max of Conc. (pCi/l)	1.8	1.2	1.7	1.6	1.6	1.8	3.7	3.8	3.4	3.4	2.5	2.3

OHRDNBK-1997	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average of Conc. (pCi/l)	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.2
Max of Conc. (pCi/l)	1.6	0.5	0.8	1.4	0.9	1.1	1.4	1.9	2.6	2.2	1.3	1.9

Note:

This is a compilation of hourly radon concentrations.

OTHER RESOURCES

DOE Public Environmental
Information Center (PEIC)
Delta Building
10995 Hamilton-Cleves Highway
Harrison, OH 45030
(513) 648-7480

Fernald Citizens Advisory Board
P.O. Box 544
Ross, OH 45061
(513) 648-6478
contact: Jim Bierer, Chair

DOE-FN Public Information
P.O. Box 538705
Cincinnati, OH 45253
(513) 648-3153
contact: Gary Stegner, Director

Community Reuse Organization
P.O. Box 38
Ross, OH 45061
(513) 648-4168
contact: David McWilliams, Chair

Fluor Daniel Fernald Public Affairs
P.O. Box 538704
Cincinnati, OH 45253
(513) 648-4068
contact: Patricia Thompson, Director

Fernald Residents for Environmental
Safety and Health
P.O. Box 129
Ross, OH 45061-0129
(513) 738-8055 (phone and fax)
contact: Lisa Crawford, President

U.S. EPA -- Region V
77 West Jackson Blvd.
Chicago, IL 60604
(312) 886-0992
contact: Jim Saric, Remedial Project
Manager

Fernald Living History Project
UC Department of Communication
P.O. Box 210184
Cincinnati, OH 45221-0184
(513) 556-4001
Contact: Steve Depoe

Fernald Health Effects Subcommittee
4770 Buford Hwy, NE, M/S F35
Atlanta, GA 30341-3724
(707) 488-7611
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