Fact Sheet for the Proposed Plan for Remedial Actions at Silos 1 & 2

This Fact Sheet briefly summarizes DOE's Proposed Plan for remedial actions at Silos 1 and 2. Additional information and details are available at the Public Environmental Information Center.

This Fact Sheet Describes:

- The background of Silos 1 and 2;
- A summary and evaluation of alternatives;
- The U.S. Department of Energy's (DOE's) preferred alternative for remedial action;
- How the public can participate in the selection/modification of the preferred alternative; and
- Where the public can obtain more information.

You are invited to a public hearing

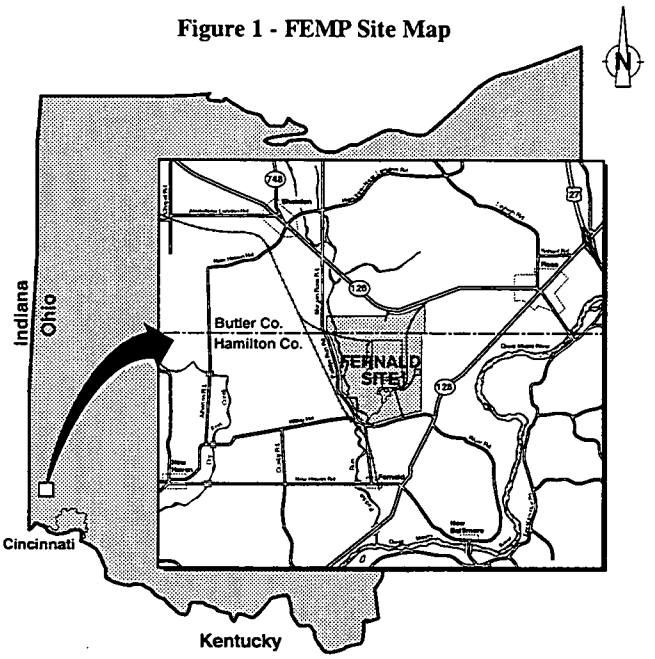
The DOE, together with the U.S. and Ohio Environmental Protection Agencies (EPA's) encourage public involvement in the decision-making process for the Proposed Plan for remedial actions at Silos 1 and 2 at the FEMP site. Representatives from DOE and U.S. and Ohio EPA's will be present at two formal public hearings to discuss remedial alternatives, including the preferred alternative, answer questions and accept public comments.

Two hearings are scheduled. The first hearing is scheduled for:
April 25th, 2000, from 6:30-8:30 p.m., at the Alpha Building, Classroom D, 10967 Hamilton-Cleves Highway, Harrison, Ohio.
The second hearing is scheduled for:
May 3, 2000, beginning at 4:30 p.m., in the Sedan Conference Room at DOE's Nevada Support Facility, 232 Energy Way, Las Vegas, Nevada.

Public Comment Period

A formal public comment period will be conducted from April 3 through May 18, 2000.

Figure 1 - FEMP Site Map



INTRODUCTION

This Fact Sheet provides a brief discussion of the DOE's proposal for management of the Silos 1 and 2 material in the area designated as Operable Unit 4 (OU4) of the Fernald Environmental Management Project (FEMP). It is DOE Policy to integrate the values of the National Environmental Policy Act (NEPA) into the procedural requirements of the Comprehensive Environmental Response Compensation and Liability Act, as amended (CERCLA). This Fact Sheet also describes how the public can participate in the selection of, or modification to, the final remedial alternative and how to obtain additional information.

SITE DESCRIPTION AND HISTORY

The FEMP is a 425-hectare (1,050 acre) former uranium processing facility located in southwestern Ohio, approximately 18 miles northwest of Cincinnati. It is located just north of Fernald, Ohio a small unincorporated community, and lies on the boundary between Hamilton and Butler Counties (see Figure 1).

The FEMP site was constructed from 1950 to 1951 under the authority of the Atomic Energy Commission, eventually known as the DOE. Between 1952 and 1989, the DOE-FEMP facility (then called the Feed Materials Production Center) produced high purity uranium metal products for the nation's defense programs. Production ceased in the summer of 1989 due to a declining demand for uranium feed products and plant activities turned their focus to environmental cleanup. In June 1991, the site was officially closed for production by an act of Congress. To reflect a new mission focused on environmental restoration, the name of the facility was changed to the FEMP in August 1991.

The FEMP site was placed on the National Priorities List (NPL) pursuant to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in 1989. Contamination at the FEMP site is currently undergoing remediation pursuant with CERCLA. As the lead agency, DOE is responsible for conducting the cleanup activities under the terms of the Amended Consent Agreement signed with the U.S. Environmental Protection Agency (EPA) in 1991.

UNDERSTANDING SILOS 1 AND 2 MATERIAL

To better manage environmental investigation and cleanup, the FEMP site was divided into five Operable Units (OUs). The OUs are defined by their physical locations and the potential for selection of similar remediation alternatives. OU4 is one of five OUs at the FEMP site. OU4 consists of the following facilities and associated environmental media

- Silos 1 and 2 and their contents (also termed K-65 silos);
- Silo 3 and its contents (also termed cold metal oxide silo);
- Silo 4 (never used, empty except for rainwater);
- Silos 1 and 2 Decant Sump Tank System, its contents, and associated Silos Underdrain System;
- A radon treatment system;
- The Vitrification Pilot Plant structure;
- The portion of a concrete pipe trench within the boundaries of OU4, and other concrete structures;
- An earthen berm surrounding Silos 1 and 2;
- Soils beneath and immediately adjacent to Silos 1, 2, 3, and 4;
- Perched groundwater near the silos that may be encountered during the implementation of cleanup activities.

Silos 1 and 2, known as the "K-65 Silos," contain the material generated from the processing of high-grade uranium ores termed pitchblende. This processing was performed to extract the uranium compounds from the natural ores. The Silos 1 and 2 material was generated consequential to the processing of natural uranium ores and is therefore classified as by-product material, as defined in Section 11(e)(2) of the Atomic Energy Act, as amended.

Silos 1 and 2 contain a total of 8,012 yd^3 of 11(e)(2) by-product material and a total of 878 yd^3 of BentoGrout™ clay for a total volume of 8,890 yd^3. The BentoGrout™ clay layer was added in 1991 to the Silos 1 and 2 material in order to reduce radon (Rn) emanation.

The significant concerns associated with the Silos 1 and 2 material include:

- High concentrations of radionuclides, including radium (Ra)-226 and thorium (Th)-230, that are present in the material.
- An elevated, gamma radiation field in the vicinity of the silos due to the material in the silos.
- Chronic emissions of Radon-222 (a radioactive gas from the decay of Radium-226) from Silos1 and 2 material into the atmosphere.
- The structural instability of the silo domes and the age of the remaining portions of the structures.
- The potential threat of the silos material leaching Resource Conservation and Recovery Act, as amended (RCRA), metals and radionuclides into the underlying sole-source aquifer.

The original remedy of vitrification was selected [after the original Feasibility Study/Proposed Plan-Draft Environmental Impact Statement (FS/PP-Draft EIS) was issued] with consideration of input received from public hearings held on March 21, 1994, in Harrison, Ohio and on May 11, 1994, in Las Vegas, Nevada. In preparation of the original OU4 Record of Decision (ROD), DOE-FEMP considered the com-

ments received both during the public comment period for the original FS/PP-Draft EIS and following issuance of the final EIS. The original OU4 ROD was approved by the EPA in December 1994.

As part of the OU4 remedial design process, a treatability study program was initiated to collect quantitative performance data to support full-scale application of the joule-heated vitrification technology to the silos material. During the joule-heated Vitrification Pilot Plant testing program, many technical and operational difficulties were encountered which resulted in documented schedule delays and cost increases. The DOE-FEMP recognized that the technical path forward for remediation of the Silos 1, 2, and 3 materials needed to be reassessed. In September 1996, DOE formally requested extension of enforceable milestones associated with implementing the OU4
remedy.

In October 1996, EPA denied DOE's request for extension of the milestones. EPA and DOE then initiated informal dispute resolution and began reevaluation of the technical path forward for the remediation of the silos material. On July 22, 1997, the DOE-FEMP and EPA formally approved an "Agreement Resolving Dispute Concerning Denial of Request for Extension of Time for Certain OU4 Milestones," hereafter referred to as "the Settlement." In the Settlement, EPA and DOE-FEMP agreed that DOE-FEMP would prepare a revised FS, PP, and ROD amendment to reevaluate the treatment remedy for Silos 1 and 2 material, and an Explanation of Significant Differences (ESD) identifying the remedial action changes for Silo 3 material. The Settlement also specified that Proof of Principle Testing would be conducted of potential Silos 1 and 2 treatment technologies to provide technical and cost data to support evaluation of treatment alternatives in the revised FS.

An ESD was completed by DOE-FEMP and approved by the EPA in March 1998 to document the change in remedy for treatment of the Silo 3 material to treatment by chemical stabilization or encapsulation and off-site disposal. Similarly, in accordance with the 1997 Settlement, DOE-FEMP placed contracts with four commercial vendors to conduct Proof of Principle testing of representative vitrification and chemical stabilization processes. DOE-FEMP utilized the data from the proof of principle testing in preparing a revised FS reevaluating vitrification and other alternatives for treatment of Silos 1 and 2 material.

Based upon the evaluation in the revised FS, DOE has issued a revised PP recommending chemical stabilization the final treatment technology for the Silos 1 and 2 material.

As part of the path forward, a DOE-FEMP and EPA agreed to accelerate removal of material from Silos 1 and 2 (Accelerated Waste Retrieval) and place the material into a Transfer Tank Area (TTA). This will allow for storage of the material in a more safe and controlled configuration pending remediation by the selected treatment alternative. In conjunction with the TTA, a Radon Control System (RCS) is being constructed to collect and control radon emissions from the TTA during waste retrieval and the remediation facility.

It is DOE policy to integrate NEPA requirements into the procedural and documentation requirements of CERCLA, wherever practicable. The NEPA impact analysis is factored into the detailed and comparative analysis of alternatives presented in Sections 3 and 4 of the revised FS and the identification of the preferred alternative in the PP. Additionally, the revised FS has been supplemented to incorporate the results of a NEPA Supplement Analysis (Appendix D of the revised FS) that assesses the potential environmental impacts associated with the alternatives being considered in the revised FS against the results of the original OU4 FS/PP-EIS. DOE approved the Supplement Analysis provided in the revised FS on the analysis of alternatives on March 21, 2000.

SUMMARY OF OPERABLE UNIT 4 RISKS

Baseline Risk Assessments were performed in 1994 to determine the potential human health effects and ecological risks that could result from exposure to the contaminants present in OU4.

The baseline assessment of human health risks quantified the health risks to hypothetical human receptors due to exposure from radioactive and chemical sources in OU4, under the no-action alternative. The process analyzed the potential, human health consequences under different scenarios if no remedial actions were taken to address identified environmental concerns.

Results of the risk assessment performed for this hypothetical, unrestricted access scenario indicated that an individual establishing residence within the highly contaminated portions of the OU4 area, under

existing conditions, would be subjected to an increased risk of incurring an adverse health effect. Risk assessment calculations performed for OU4 indicate that the projected level of increased risk exceeds established federal regulatory guidelines. Based on the results of the baseline risk assessment, the DOE-FEMP concluded in the *Remedial Investigation Report for Operable Unit 4* (FEMP 1993a) that existing site conditions warrant remedial action.

A summary of the original assessment results can be found in Appendix F of the revised FS. Appendix D and Section 6.0 of the OU4 Remedial Investigation provide detailed information on the baseline assessment of human health risks.

SUMMARY OF ALTERNATIVES

Potential treatment technologies were examined for their capability to treat Silos 1 and 2 material. These technologies were screened to eliminate those that were impractical to implement or ineffective at addressing the hazards associated with the silos material. The results of the initial screening of treatment technologies were reviewed with stakeholders at a public meeting in December 1998. Based upon the screening of potential treatment technologies, vitrification and chemical stabilization were identified for further evaluation (i.e., for a detailed analysis to examine the merits of each at addressing the concerns associated with the silos material). To provide a comprehensive and thorough evaluation, each of these two technologies were evaluated in the Detailed Analysis of Alternatives and Comparative Analysis of Alternatives (Sections 3 and 4 of the revised FS) based upon two representative process options, resulting in four alternatives as follows:

- Vitrification - Joule-heated;
- Vitrification - Other;
- Chemical Stabilization - Cement-based; and
- Chemical Stabilization - Other.

A detailed discussion of these alternatives is available in Section 3 of the revised FS, which is available for review at the Public Environmental Information Center (PEIC), 10995 Hamilton-Cleves Highway, Harrison (see map on page 8). The treatment systems described in this section have been developed as a viable way to remediate Silos 1 and 2 material based upon data and other information compiled from the OU4 FS/PP-Draft EIS, the Vitrification Pilot Plant, and Proof of Principle (POP) testing. Equivalent systems may exist and are not precluded from consideration, consistent with the final selected remedy, during remedial design.

On-site Joule-heated Vitrification, Off-site Disposal at the Nevada Test Site (VIT1)

This alternative (VIT1) involves the removal, on-site treatment through joule-heated vitrification, and off-site disposal of the treated silos material at the Nevada Test Site (NTS). This alternative involves construction of a feed preparation system to prepare and deliver a feed slurry containing both silos material and glass-formers to the melter, a nominal 15-ton per day (TPD) joule-heated melter, and a melter off-gas system to provide necessary treatment of effluent gases. The full-scale treatment facility also includes many support systems such as product cooling, wastewater treatment, off-specification material rework, building ventilation, and personnel support facilities.

The total estimated disposal volume of the treated Silos 1 and 2 material and all secondary wastestreams is 10,325 m^3 (13,505 yd^3), resulting in approximately 2,398 shipping and disposal containers would be shipped to the NTS. If two containers were placed on one truck per shipment, approximately 1,199 direct truck shipments to the NTS would be required. The estimated cost for this alternative is $356 million.

On-site Vitrification other than Joule-heated, Off-site Disposal at the NTS (VIT2)

This alternative (VIT2) involves the removal, on-site treatment through vitrification by a process other than joule-heated (combustion melter), and off-site disposal of the treated silos material at the NTS. This alternative involves construction of a feed preparation system to prepare and deliver a dry feed containing both silos material and glass-formers to the melter, a nominal 15-TPD combustion-heated melter, and a melter off-gas system to provide necessary treatment of effluent gases. The full-scale treatment facility also includes many support systems such as product forming, wastewater treatment, off-specification material rework, building ventilation, and personnel support facilities.

The total estimated disposal volume of the treated Silos 1 and 2 material and all secondary wastestreams

TABLE 2
EVALUATION CRITERIA

1. **Overall protection of human health and the environment:** Examines whether a remedy would provide adequate overall protection to human health and the environment. Evaluates how risks would be eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls included in the alternative.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs):** Determines if a remedy would meet all pertinent environmental laws and policy siting requirements.

3. **Long-term effectiveness and permanence:** Evaluates the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. **Reduction of toxicity, mobility, or volume through treatment:** Reviews the anticipated performance of the proposed treatment technologies for their abilities to reduce the hazards of, prevent the movement of, or reduce the quantity of waste materials.

5. **Short-term effectiveness:** Evaluates the ability of a remedy to achieve protection of workers, the public, and the environment during construction and implementation.

6. **Implementability:** Examines the practicality of carrying out a remedy, including the availability of materials and services needed during construction and operation.

7. **Cost:** Reviews both estimated capital, operation and maintenance costs of the remedy. Costs are represented as present worth costs. "Present worth" is defined as the amount of money that, if invested in the first year of implementing a remedy and paid out as needed, would be sufficient to cover all costs associated with the remedy over its planned life. Present worth costs allow remedies that would occur over different time periods to be compared on an even basis.

8. **State acceptance:** Evaluates the technical and administrative issues and concerns the State of Ohio may have regarding each of the alternatives (Will be addressed in the Comment Responsiveness Summary made available with the Record of Decision).

9. **Community acceptance:** Evaluates the issues and concerns of the public regarding each of the alternatives (Will be addressed in the Comment Responsiveness Summary made available with the Record of Decision).

is 14,220 m^3 (18,600 yd^3), resulting in approximately 2,162 shipping and disposal containers would be shipped to the NTS. If two containers were placed on one truck per shipment, approximately 1,081 direct truck shipments to the NTS would be required. The estimated cost for this alternative is $342 million.

On-site Chemical Stabilization Cement-based, Off-site Disposal at the NTS (CHEM1)

This alternative (CHEM1) involves the removal, on-site treatment through chemical stabilization by a cementation process, and off-site disposal of the treated silos material at the NTS. This alternative involves construction of a feed preparation system to prepare and deliver a feed slurry containing both silos material and cement-based additives to the mixer, a nominal 80-TPD mixer, and an air emissions system to provide necessary treatment of radionuclide particulate. The full-scale treatment facility also includes many support systems such as product curing, off-specification material rework, building ventilation, and personnel support systems.

The total estimated disposal volume of the treated Silos 1 and 2 material and all secondary wastestreams is 37,819 m^3 (49,500 yd^3), resulting in approximately 6,078 shipping and disposal containers that would be shipped to the NTS. If two containers were placed on one truck per shipment, approximately 3,039 direct truck shipments to the NTS would be required. The estimated cost for this alternative is $297 million.

On-site Chemical Stabilization other than Cement-based, Off-site Disposal at the NTS (CHEM2)

This alternative (CHEM2) involves the removal, on-site treatment through chemical stabilization by a process that is not cement-based, and off-site disposal of the treated silos material at the NTS. This alternative involves construction of a feed preparation system to prepare and deliver a feed slurry containing both silos material and chemical additives to the container with built-in agitation, three container lines making up the nominal 105-TPD processing plant, and an air emissions system to provide necessary treatment of radionuclide particulate. The full-scale treatment facil-

ity also includes many support systems such as product curing, wastewater treatment, off-specification material rework, building ventilation, and personnel support facilities.

The total estimated disposal volume of the treated Silos 1 and 2 material and all secondary wastestreams is 34,444 m^3 (45,050 yd^3), resulting in approximately 6,106 shipping and disposal containers that would be shipped to the NTS. If two containers were placed on one truck per shipment, approximately 3,053 direct truck shipments to the NTS would be required. The estimated cost for this alternative is $303 million.

EVALUATION OF ALTERNATIVES

No significant differences were identified in the detailed analysis of alternatives that provide a compelling reason to select a given process option over the other (i.e., CHEM1 vs. CHEM2 or VIT1 vs. VIT2) in either treatment technology. For this reason, the final remedial selection decision will be between the vitrification and chemical stabilization technologies.

Evaluation Criteria

Section 4 of the revised FS presents a comparative analysis of alternatives for the treatment of the Silos 1 and 2 material with respect to the nine evaluation criteria specified by the NCP to meet the requirements of CERCLA. This analysis is the second stage of the detailed evaluation process and forms the basis for identifying the preferred remedial alternative for the Silos 1 and 2 material.

The NCP divides the evaluation criteria used in this comparative analysis into three categories: threshold, primary balancing, and modifying. More detailed definitions of the evaluation criteria can be found in Section 3.1, Overview of the Detailed Analysis of the revised FS.

Threshold criteria consist of the two criteria that must be satisfied by the selected alternative:

- Overall protection of human health and the environment; and
- Compliance with applicable or relevant and appropriate requirements (ARARs).

These criteria are of greatest importance in the comparative analysis because they reflect the key statutory mandates of CERCLA, as amended. An *alternative* must satisfy both of these *threshold criteria* before it is eligible to be selected as the final remedy.

Primary balancing criteria consist of the five criteria under which the relative advantages and disadvantages of the alternatives are compared to determine the best overall remedy:

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability; and
- Cost.

The first and second balancing criteria reflect the statutory preference for treatment as a principal element of the remedy and the bias against off-site land disposal of untreated material. Together with the third and fourth balancing criteria, they form the basis for determining the general feasibility of each potential remedy. In addition, the primary balancing criteria are used to determine whether costs are proportional to the overall protectiveness, considering both the remediation activity and the time period following restoration of the OU4 area. By this approach, it can be determined if a potential remedy is cost-effective.

The final two criteria, identified in the NCP as *modifying criteria*, will be evaluated following public and agency comments on the revised FS and PP and will be addressed in the ROD amendment once a final proposed remedy is selected. The modifying criteria are:

- State acceptance; and
- Community acceptance.

Figure 3 summarizes the comparative analysis of the alternatives.

PREFERRED ALTERNATIVE

The preferred RA for the Silos 1 and 2 material is the complete removal of all material from storage, on-site treatment by chemical stabilization, and off-site disposal of treated Silos 1 and 2 waste at the NTS. In addition, the preferred alternative includes the decontamination and dismantlement of all structures and remediation facilities and appropriate treatment and disposal of all secondary wastes. In the event secondary wastes generated during the treatment operations

FIGURE 3
COMPARATIVE ANALYSIS SUMMARY

ITEM	VIT1/VIT2			CHEM1/CHEM2	
	Strongly Favors	Favors	Neutral	Favors	Strongly Favors
Overall Protection of Human Health and the Environment			↓		
Compliance with Applicable or Relevant and Appropriate Requirements			↓		
Long-Term Effectiveness and Permanence			↓		
Reduction of Toxicity, Mobility, or Volume Through Treatment		↓			
Short-Term Effectiveness				↓	
Implementability				↓	
Cost			↓		
State Acceptance - TBD					
Community Acceptance - TBD					

of the Silos 1 and 2 material or decontamination and dismantlement activities cannot be disposed at the NTS, without additional treatment, these secondary wastes may be treated and/or disposed at an appropriately licensed off-site facility. Concrete from Silos 1 and 2 structures will undergo gross decontamination, demolition, size reduction, and packaging for shipment for off-site disposal at the NTS or an appropriately licensed commercial disposal facility. Contaminated soils and debris, excluding concrete from Silos 1 and 2 structures, will be disposed in accordance with either the FEMP On-site Disposal Facility waste acceptance criteria or an appropriately licensed facility, such as the NTS or a permitted commercial disposal facility. Perched water encountered during remediation activities will be collected and directed to the FEMP OU5 water treatment facilities.

Chemical stabilization is recommended as the preferred treatment alternative because it meets the threshold criteria and provides the best balance of tradeoffs compared to vitrification with respect to the five balancing criteria. Specifically, the advantages of chemical stabilization in implementability (commercial demonstration, operability, ease of acceleration, and constructability) and short-term effectiveness (worker risk and time to achieve protection) are judged to outweigh the advantages of vitrification due to its lower treated waste volume.

The preferred alternative will satisfy the statutory requirements of CERCLA Section 121(b). The selected remedy will achieve a standard or level of control consistent with all federal and State of Ohio ARARs and To Be Considered (TBC) criteria. The preferred alternative will also be performed in accordance with all pertinent DOE orders. Utilization of chemical stabilization satisfies the preference for remedies that employ treatment as a principal element. By chemically binding the contaminants into a solid matrix, the leachability of contaminants is reduced to levels that have been determined to be protective. As a result, chemical stabilization and off-site disposal will provide permanent treatment for the Silos 1 and 2 material. In addition, the cost is proportional to the overall protectiveness provided by the preferred remedy.

COMMUNITY PARTICIPATION

Community acceptance is one of the criteria that DOE and EPA are committed to considering during the decision-making process for selecting a remedy for the Silos 1 and 2 material. The NCP specifies that the public be given the opportunity for input in selection of RAs. Specifically, the NCP [40 CFR 300.430(f)(3)] specifies that after a PP is prepared, the public be provided a reasonable opportunity for submission of comments on the PP and the supporting analysis, including the FS. This interaction with the community is critical to the CERCLA process and to making sound environmental decisions.

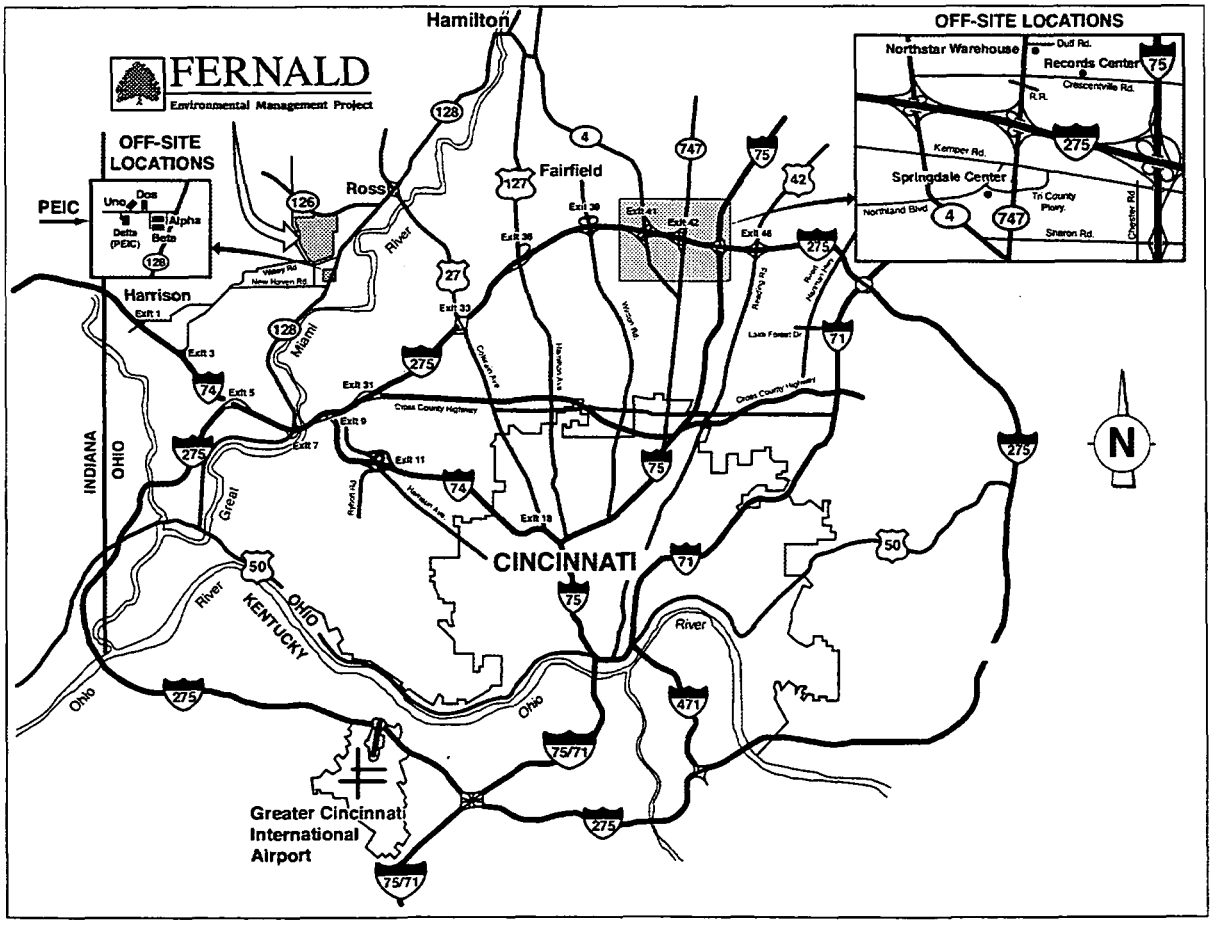
The formal public comment period will be April 3 through May 18, 2000. Oral comments may be presented at a formal public hearing that will be conducted April 25, 2000, 7:00 p.m., at the Alpha Building, Classroom D, 10967 Hamilton-Cleves Highway.

Information relevant to Silos 1 and 2, including the Revised Feasibility Study Report for Silos 1 and 2, the Revised Proposed Plan for Remedial Actions at Silos 1 and 2, and supporting technical reports is in the Administrative Record located at the PEIC. The address and operating hours for the PEIC are as follows:

Public Environmental Information Center
10995 Hamilton-Cleves Highway
Harrison, Ohio 45030
513-648-7480

Monday, 7:30 a.m. to 8 p.m
Tuesday - Thursday, 7:30 a.m. to 5 p.m.
Friday, 7:30 a.m. to 4:30 p.m.

For additional information on public participation activities related to the revised Silos 1 and 2 FS, PP, or the FEMP site, visit the DOE-FEMP website at http://www.fernald.gov.



COMMENT SHEET

DOE is interested in your comments on the cleanup alternatives being considered in the Revised Feasibility Study/Proposed Plan for remedial actions at Silos 1 & 2. Please use the space provided below to write your comments, then fold, staple or tape, and mail this form. We must receive your comments on or before the close of the public comment period on May 18, 2000. If you have questions about the comment period, please contact Gary Stegner, the DOE Public Information Officer at Fernald, at (513) 648-3153.

Name: _____

Address: _____

City/State/Zip: _____

Phone: _____

MAILING LIST ADDITIONS:

Please add my name to the Fernald Mailing List to receive additional information on the cleanup progress at the Fernald Environmental Management Project:

YES NO

Additional information or related cleanup documents are available to the public at the following location:

PUBLIC ENVIRONMENTAL INFORMATION CENTER
10995 Hamilton-Cleves Highway
Harrison, OH 45030
(513) 648-7480

fold here

fold here

Name
Address

Place
Stamp
Here

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