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**FACT SHEET: REMEDIAL DESIGN UPDATE FOR THE OPERABLE UNIT 4  
REMEDIAL ACTION AT FERNALD JUNE 1995**

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## Fact Sheet:

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# Remedial Design Update for the Operable Unit 4 Remedial Action at Fernald

June 1995

### This Fact Sheet Describes:

- An overview of the U.S. Department of Energy's (DOE's) remedial design management strategy for Operable Unit 4;
- The status of the Operable Unit 4 remedial design;
- The status of the Operable Unit 4 Pilot Plant Treatability Study Program;
- Opportunities for public involvement during the Operable Unit 4 remedial design process; and
- Where the public can obtain more information.

#### You are invited to a public workshop

The DOE, together with the U.S. and Ohio Environmental Protection Agencies (EPAs), encourage public involvement in the decision-making process for the development and implementation of remedial action of Operable Unit 4 at Fernald. Representatives from DOE and the EPAs will be present at a public workshop to discuss the remedial design process for the Fernald Environmental Management Project. The workshop is scheduled from 7 p.m. to 9 p.m., on June 13, 1995, at the Plantation, 9660 Dry Fork Road, Harrison, Ohio.

## INTRODUCTION

This fact sheet was prepared to update the public on the remedial design activities which have taken place and are scheduled relative to the Operable Unit 4 (Silos 1-4) remedial action. This fact sheet provides a general overview of the remedial design process as it applies to the Operable Unit 4 remedial action and the U.S. Department of Energy's (DOE's) approach for the management of the Operable Unit 4 remedial design at the Fernald Environmental Management Project (FEMP). This fact sheet also provides a summary of other project-specific issues of public interest, including a discussion of public involvement opportunities during the remedial design process for Operable Unit 4.

## BACKGROUND

The FEMP is a DOE-owned, contractor-operated federal facility that produced high-purity uranium metal products for the DOE and its predecessor agencies from 1952 to 1989. Thorium was also processed, but on a smaller scale, and stored on site. Production activities ceased in 1989, and the production mission formally ended in 1991. The Fernald site was included on the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) National Priorities List in 1989. The current mission is the safe environmental restoration of the site in accordance with all applicable requirements.

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## UNDERSTANDING OPERABLE UNIT 4

Operable Unit 4 is one of five operable units at the FEMP. Operable Unit 4 consists of the following facilities and associated environmental media (See Figure 1):

- Silos 1 and 2 and their contents (K-65 residues, by-product material);
- Silo 3 and its contents (cold metal oxides, by-product material);
- K-65 decant sump tank and its contents;
- Silo 4 (empty, except for rainwater infiltration);
- A radon treatment system;
- A portion of a concrete pipe trench and other concrete structures;

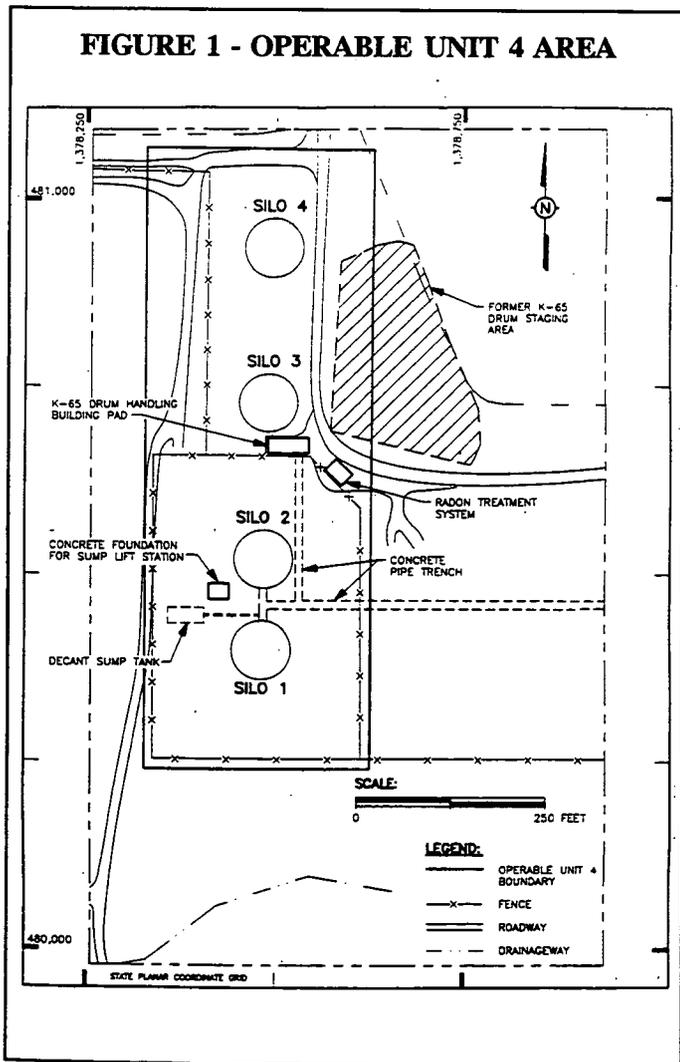
- An earthen berm surrounding Silos 1 and 2;
- Soils beneath and immediately surrounding Silos 1, 2, 3, and 4;
- Perched groundwater encountered in the vicinity of the silos during the implementation of cleanup activities.

Originally constructed in 1951 and 1952, three of the four silos received residues until 1958. Silos 1 and 2 were originally constructed to provide temporary storage of the K-65 residues, generated from the processing of uranium ores until they could be returned to the African Metals Corporation. After remaining in storage at the FEMP for more than 30 years, ownership of the K-65 residues was transferred to the United States government in 1984. Note that the term "K-65" was used to describe the processed uranium ores.

The K-65 residues have been the focus of considerable attention from DOE, U.S. EPA, Ohio EPA, and the community due to the nature of the materials and their present storage configuration. Significant concerns associated with Silos 1 and 2 include:

- High concentrations of radionuclides, including radium and thorium, which are present in the materials stored in the silos;
- An elevated, direct-penetrating radiation field in the silos;
- Chronic emissions of radon (a radioactive gas from the decay of radium) from Silos 1 and 2 into the atmosphere;
- The structural instability of the silo domes and the age of the structures;
- The potential threat of the radioactive residues leaching into the underlying sole-source aquifer that is the primary drinking water source for this area.

Due to deterioration, in 1963 site workers repaired the concrete coating around each silo and constructed an earthen berm around them to counterbalance the outward



load from the silo contents. The berm also protected the silo walls from weathering and serves as a radiation shield. This berm was expanded in 1983 to reduce soil erosion.

Other improvements to Silos 1 and 2 included: sealing the vents in the domes in 1979; installing plywood covers over the center section of the domes in 1986; and adding a polyurethane coating in 1987 to reduce weathering and to help lower radon emissions. A radon treatment system (RTS) was also installed to draw air from the silos, remove moisture and radon through a charcoal-adsorption process, and recirculate clean air back into the silos. The lower radon emissions, as a result of the RTS, then allowed workers to safely apply a layer of bentonite clay over the K-65 residues within the silos. The bentonite clay layer has significantly reduced the amount of radon escaping from the silos into the environment and would help prevent the release of contaminants into the air if a natural disaster (e.g., a tornado) should occur or if the silo domes were to collapse.

Silo 3 received metal oxides generated from FEMP refinery operations. The cold metal oxides in Silo 3 have a significantly lower direct radiation field and radon emanation rate than the K-65 residues in Silos 1 and 2; however, there is concern that dust particles would escape in the event the silo structure were to collapse.

Silo 4 was never used for material storage and remains empty today, except for some rainwater that has accumulated in the silo through the leaky silo dome. Silo 4 is not considered a current or potential threat to human health and the environment.

## **OPERABLE UNIT 4 ENVIRONMENTAL REMEDIAL ACTION PROCESS**

### **Record of Decision for Remedial Action**

On December 7, 1994, the U.S. EPA signed the *Record of Decision for Remedial Action at Operable Unit 4*.

The Operable Unit 4 Record of Decision (ROD) addresses the removal and treatment of Silos 1, 2, and 3, and decant sump tank contents; off-site shipment and disposal of treated material; decontamination and demolition of structures; and remediation of Operable Unit 4 demolished structures, debris, and soils. Table 1 provides the major components of the Operable Unit 4 Remedial Action.

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**TABLE 1  
MAJOR COMPONENTS OF THE OPERABLE  
UNIT 4 REMEDIAL ACTION**

- Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.
- Vitrification of the residues and sludges removed from the silos and the decant sump tank.
- Off-site shipment to the Nevada Test Site for disposal of the vitrified contents of Silos 1, 2, 3, and the decant sump tank.
- Demolition of Silos 1, 2, 3, and 4 and decontamination, to the extent practical, of the concrete rubble, piping, and other generated construction debris.
- Removal of the earthen berms and excavation of contaminated soils within the boundary of Operable Unit 4 to achieve proposed remediation levels and placement of clean backfill following excavation.
- Demolition of the vitrification treatment unit and associated facilities and decontamination or recycling of debris prior to disposition.
- On-property interim storage of excavated contaminated soils and remaining contaminated debris in a manner consistent with the approved *Work Plan for Removal Action 17 (Improved Storage of Soil and Debris)*.
- Treatment of any contaminated perched water encountered during remediation at the FEMP Advanced Wastewater Treatment facility.
- Continued access controls, maintenance, and monitoring of the stored waste inventories.
- Disposal of remaining Operable Unit 4 contaminated soils and debris consistent with the selected remedies for Operable Units 5 and 3.

**Phased Approach**

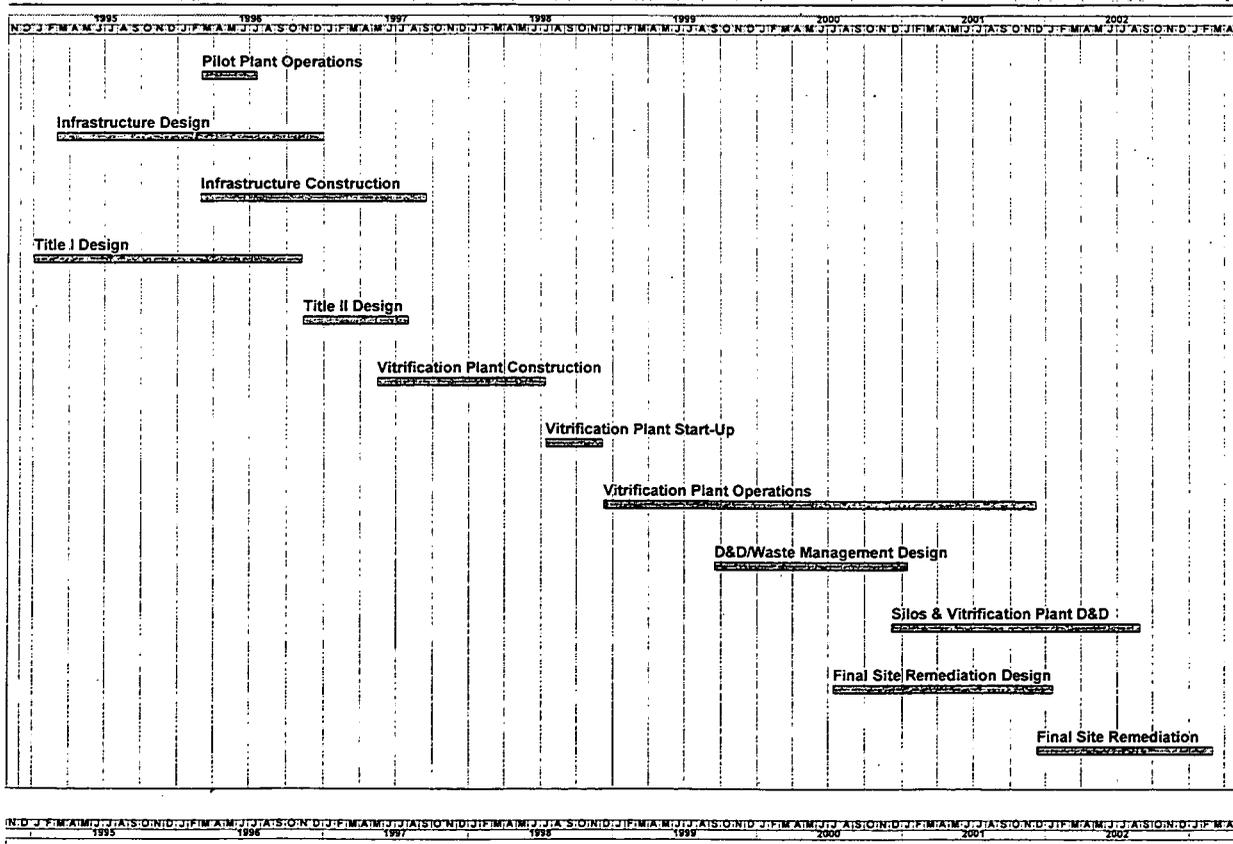
The strategy for remediation of Operable Unit 4 utilizes a phased approach. It involves a series of logically planned activities allowing the various technical, financial, and regulatory constraints to be addressed by the project in a controlled fashion. The timing and relationship of these activities is depicted in Figure 2. They include technology development and demonstration, design and construction of the vitrification plant and associated infrastructure, removal and treatment of the Operable Unit 4 residues, decontamination and demolition of Operable Unit 4 structures and facilities upon completion of waste treatment operations, and final site remediation activities.

The Pilot Plant Treatability Study program represents a key element of technology demonstration and development for Operable Unit 4. The Pilot Plant program builds upon the success of the already completed RI/FS bench scale treatability testing.

Operation and testing of the Pilot Plant will demonstrate the vitrification technology process for application at Fernald. The program will provide quantitative performance data for the vitrification processes and equipment and is essential to the success of the Operable Unit 4 remediation effort. As testing is completed and evaluated, the results will be incorporated into the ongoing Title I design of the full scale facility.

The start of construction of the infrastructure associated with the vitrification plant on or before March 3, 1996 achieves compliance with CERCLA Section 120(e)(2) requirements for initiating substantial, continuous physical remediation activities within 15 months of the approved Operable Unit 4 ROD. Site preparation, underground utilities, the superstructures for silos 1, 2, and 3, and the silo headspace radon treatment system will be constructed as the design of the vitrification plant itself is being finalized. This approach minimizes project cost and schedule risks associated with

**FIGURE 2 - PHASED APPROACH TO OPERABLE UNIT 4 ENVIRONMENTAL REMEDIATION**



development of the vitrification technology for application at Fernald.

The approach to final site remediation for Operable Unit 4 (i.e., removal and disposal of contaminated soil and debris) will be greatly influenced by the approved ROD for Operable Units 3 and 5. Phasing and integration of these programs affords the Operable Unit 4 remedial design the benefit of utilizing the most current decision making information developed by those operable units.

#### Pilot Plant Treatability Study Program Status

Currently, the Pilot Plant is under construction. Figure 3 depicts the current status of construction of the Pilot Plant facilities.

The Pilot Plant Treatability Study program consists of the design, construction, and operation of a one metric

ton/day facility that will demonstrate waste retrieval and the vitrification technology. The program will be conducted in two phases.

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Phase I Pilot Plant operation involves equipment and process demonstration that will use a non-radioactive surrogate material, consisting of silty sands, bentonite, water, glass forming additives and other chemicals. Phase I is scheduled to be initiated in late September 1995, will operate over a two to three month period, and will use about 20 tons of surrogate material.

Phase II Pilot Plant operation is scheduled to begin in March 1996. About 30 tons of actual K-65 and 7 tons of Silo 3 material will be processed over a two to three month period. In addition, Phase II will demonstrate the hydraulic removal of actual K-65 material and the pneumatic removal of Silo 3 material. Radon control

**FIGURE 3 - THE PILOT PLANT FACILITIES UNDER CONSTRUCTION**



through the off-gas treatment system will also be demonstrated during Phase II.

## **OPERABLE UNIT 4 REMEDIAL DESIGN AND REMEDIAL ACTION**

Remedial design and remedial action are two distinct, but interrelated, activities that implement the ROD actions. Typically, remedial design begins around the time the ROD is signed, and the remedial action is initiated within 15 months from that date.

### **Remedial Design Work Plan**

The purpose of the remedial design is to translate the remedy identified by the Operable Unit 4 ROD into processes and equipment designs that will ensure that remedial action will be implemented in a manner that meets all the objectives specified in the Operable Unit 4 ROD. Specifically, the remedial design consists of developing detailed drawings, specifications, and performance criteria that will be included in construction bid packages for remedial activities.

The remedial design activities will be performed by a qualified subcontractor. Multi-disciplinary teams will be used to review the remedial designs and construction bid packages. These teams are made up of representatives from various FEMP organizations having disciplines in engineering, construction, environmental, health and safety, quality assurance, regulatory, waste management, safe shutdown, etc., as well as various representatives from the DOE Fernald Area Office. This approach ensures that all technical, regulatory, and administrative issues for a specific project are properly addressed, thereby providing the integration and coordination necessary to ensure effective implementation of the project.

The *Work Plan for the Operable Unit 4 Remedial Design* is the primary document to be used to implement the Operable Unit 4 remedial design activities. It has been prepared in accordance with the requirements of the Amended Consent Agreement, CERCLA and the

Resource Conservation and Recovery Act (RCRA).

~~The draft *Work Plan for Operable Unit 4 Remedial Design* was conditionally approved by Ohio EPA and U.S. EPA on February 27, 1995, and March 27, 1995, respectively. The final version of the Operable Unit 4 Remedial Design Work Plan, submitted to U.S. EPA and the Ohio EPA on May 16, 1995, provides the overall framework for developing designs and the schedule for submittal of deliverables to the agencies. Design tasks to be performed during Operable Unit 4 remedial design are summarized in Table 2.~~

**TABLE 2  
TASKS TO BE PERFORMED DURING  
OPERABLE UNIT 4 REMEDIAL DESIGN**

- |                 |  |
|-----------------|--|
| <b>Task I</b>   | <b>Project Planning Documentation</b> <ul style="list-style-type: none"><li>● Functional Requirements Document</li><li>● Design Criteria Package</li></ul>   |
| <b>Task II</b>  | <b>Title I/II Design - Remedial Facilities Infrastructure</b> <ul style="list-style-type: none"><li>● Underground Utilities/Site preparation</li><li>● Silo Superstructures</li><li>● Silo Headspace Radon Treatment System</li></ul>  |
| <b>Task III</b> | <b>Title I/II Design - Vitrification Plant</b> <ul style="list-style-type: none"><li>● Waste Retrieval System</li><li>● Vitrification Process</li><li>● Product Forming Equipment</li><li>● Product Handling/Interim Staging Facility</li><li>● Off-gas Treatment System</li></ul> |
| <b>Task IV</b>  | <b>Title I/II Design - D&amp;D/Waste Management</b> <ul style="list-style-type: none"><li>● Silo structures D&amp;D</li><li>● Decant sump tank system D&amp;D</li><li>● Remedial process facility D&amp;D</li><li>● Waste Management</li></ul>                                     |
| <b>Task V</b>   | <b>Title I/II Design - Final Site Remediation</b> <ul style="list-style-type: none"><li>● Contaminated soil remediation</li><li>● Contaminated perched water remediation</li><li>● Final Site Preparation</li></ul>  |

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### Remedial Action Work Plan

Consistent with the *Work Plan for the Operable Unit 4 Remedial Design* and the Amended Consent Agreement, the DOE will prepare a Remedial Action Work Plan which will describe the implementation strategy and schedule for completion of all remedial activities.

The remedial action will be implemented through a series of remedial construction tasks and operation of the vitrification plant. DOE and FERMCO will oversee the construction by conducting inspections of the subcontractor's activities to ensure that all work adheres to the performance specifications. FERMCO will operate the vitrification plant. The Operable Unit 4 Remedial Action Work Plan will be structured into two document submittals. The Phase I Remedial Action Work Plan will focus on the implementation of the initial remedial action activities:

- Underground Utilities/Site Preparation;
- Silo Superstructure Construction; and
- Silo Headspace Radon Treatment System Construction

The Phase II Remedial Action Work Plan will address the remaining remedial action activities:

- Vitrification Plant Construction and Operation;
- D&D / Waste Management; and
- Final Site Remediation

The Phase I Remedial Action Work Plan is scheduled to be submitted to U.S. EPA and Ohio EPA in October 1995 and the Phase II Remedial Action Work Plan submittal is scheduled in October 1996.

### COMMUNITY INVOLVEMENT

When possible, Operable Unit 4 management will offer public involvement opportunities beyond regulatory-required levels, surpassing regulatory requirements. During remedial design and remedial action, the public will be informed of the status of activity schedules and progress, as well as any new findings or significant developments.

Upon submittal of draft and final remedial design and remedial action packages to the U.S. EPA, key stakeholders, including community leaders, will be informally notified of the documents' availability at the Public Environmental Information Center (PEIC). The PEIC is located in the JAMTEK Building, 10845 Hamilton-Cleves Highway, Harrison, Ohio (phone: 513-738-0165). The facility is open Monday and Thursday, 9 a.m. to 7 p.m.; Tuesday, Wednesday and Friday, 9 a.m. to 4:30 p.m.; and Saturday, 9 a.m. to 1 p.m.

When feasible, information regarding Operable Unit 4 related community meetings and public involvement opportunities will be provided in a recorded message on Fernald's community access line: 513-648-6272, available 24 hours daily. For further information, please call DOE Fernald Area Public Information Director Gary Stegner at 513-648-3153.

#### **Required Public Involvement Activities During Remedial Design and Remedial Action**

- Upon completion of the final engineering design, prepare a fact sheet describing the remedial design [NCP 300.435].
- Provide a public briefing upon completion of the final engineering design and prior to the beginning of the remedial action [NCP 300.435].

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**Opportunities for Public Involvement during the Operable Unit 4 remedial Action**

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**Availability of Key Decision-Making Documents:**

Throughout the remedial design process, DOE will continue to make key decision-making documents available to the public for inspection. As these documents are issued, DOE will inform the public of their availability. For Operable Unit 4, such documents will include, but not necessarily be limited to, the remedial design and remedial action work plans, and the formal EPA design review package submittals. Copies of these documents will be made available at the Public Environmental Information Center, JAMTEK Building, 10845 Hamilton-Cleves Highway, Harrison, Ohio 45030, (513) 738-0164 or 738-0165.

**Public Briefings:** DOE will continue to update the public through briefings at township and citizens' group meetings, community workshops, etc. One such briefing will be the public meeting scheduled for June 29, 1995 to discuss FEMP Waste Packaging and Transportation issues, including those of Operable Unit 4.

**Fact sheets:** In addition, other mechanisms, such as fact sheets, may be provided to the public with information on key decision-making documents and/or issues affecting implementation of the remedial action.

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