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**PROGRESS REPORT OPERABLE UNIT 1 WASTE
PIT AREA OCTOBER 1992**

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Fernald Project

Remedial Investigation/ Feasibility Study

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PROGRESS REPORT

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Operable Unit 1 WASTE PIT AREA

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Introduction

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented.

The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup.

During the course of the RI/FS effort, certain conditions are occasionally identified which call for more immediate action. These actions are called "Removal Actions" and are initiated where there is a need to accelerate cleanup activities to address releases or potential releases of hazardous substances. Removal Actions are coordinated with the U.S. EPA and the Ohio EPA.

Following is a progress report on Operable Unit 1 including its history, the current status of RI/FS activities, cleanup alternatives under consideration, and work being done to alleviate near-term concerns.

Background

Operable Unit 1 includes the six waste pits, the burn pit and the clearwell. The six waste pits, built between 1952 and 1979, contain waste from past operations at the Fernald site. No waste has been placed in any of the pits since the mid-1980s. Pits 1-3 are covered with soil. Pit 4 is covered with bentonite clay and a synthetic cover. Pits 5 and 6 are lined with synthetic membranes. The pits range in size from that of a football field to a baseball diamond and vary in depth from 13 to 30 feet. It is estimated that the six pits contain approximately 475,000 tons of waste, including uranium, thorium and other radioactive and chemical elements.

The burn pit, built in 1957, was used to burn laboratory chemicals and general refuse before it was taken out of service in 1970.

The clearwell was a settling basin for stormwater

runoff from portions of the waste pit area including Pits 1-3 and Pit 5. Sediment in the base of the clearwell is estimated to be 3.5 feet deep and contains concentrations of radionuclides and chemical constituents.

RI/FS Activities

Waste Characterization and Treatability: Chemical and radiological analyses of samples taken from materials in Waste Pits 1-4 and the Burn Pit are complete. Samples taken from Pits 5 and 6 and the Clearwell were previously analyzed. This information is required to complete the Operable Unit 1 Remedial Investigation Report and treatability studies. Completion of these analyses represents the conclusion of the field investigations portion of the RI/FS for Operable Unit 1.

Samples of additional waste materials from Pits 5, 6, and the Clearwell were obtained in February 1992 to support ongoing treatability studies. Several 55-gallon drums of sludge from each waste unit were collected. Samples not transported to off-site laboratories for treatability studies have been archived at Fernald to support future remedial design activities.

All waste material samples were analyzed at U.S. EPA-approved laboratories to determine the concentration of radiological and chemical constituents in Operable Unit 1. Validation of the laboratory data received from the analysis of the Operable Unit 1 field investigation has been completed.

Data validation is a process in which a team of chemists, radiochemists, statisticians, quality assurance and other technical personnel, systematically review all aspects of data collection and laboratory analyses against an established set of criteria. Data validation is used to judge the quality of the field and analytical data for use in the RI/FS decision making process.

Samples of materials in the pits are being used for testing of waste treatment technologies (called treatability studies) currently under consideration, including cementation (stabilizing the waste with cement) and vitrification (transforming the waste into glass). Data collected from treatability studies

are used in the RI/FS and remedial design processes to evaluate the performance, cost, and practicality of treatment technologies.

The U.S. EPA's Guidance for Conducting Treatability Studies under CERCLA outlines a three-tiered approach to conducting treatability studies which includes: 1) Remedy Screening; 2) Remedy Selection, and 3) Remedy Design.

The IT Environmental Technology Development Center in Oak Ridge, Tenn., is in the process of conducting the Remedy Screening and Remedy Selection portions of the CERCLA treatability studies. Remedy Screening studies at the Development Center are using composite samples from each waste pit, while Remedy Selection studies are using strata samples from each waste pit.

Composite samples (samples blended from discrete samples to represent the average properties of the waste units) are being used during the initial Remedy Screening phase of the treatability program to provide a timely decision on whether a technology can be applied at Fernald. Following this decision, Remedy Selection studies proceed using strata samples (samples collected from discrete locations within the waste unit) to provide valuable process information, including the relative ability of the technology to treat the range of waste types and forms in a particular pit.

Cement Stabilization

Studies continue at the IT Environmental Technology Development Center in Oak Ridge, examining the feasibility of stabilizing Fernald pit waste with cement. These studies involve mixing quantities of waste pit materials with differing amounts of cement and cement additives. Remedy Screening studies have been completed and the waste has been determined to be suitable for cementation.

The Remedy Selection portion of stabilization treatability studies for cement is now in progress at the Development Center and is expected to be completed in July 1993.

As part of these studies, each of the solidified waste forms from the stabilization treatability studies is subjected to a series of physical and chemical tests, including leaching the waste in acid, to determine which cement mix design exhibits the best properties for retaining the physical form and stabilizing the waste materials.

Vitrification studies

Vitrification studies also have been initiated at the IT Environmental Technology Development Center. The Remedy Screening portions of vitrification studies were completed in June 1992, and the waste has been determined to be suitable for vitrification. Representative samples from each of the waste units are being mixed with a range of materials, including flyash, and placed into high-temperature furnaces

with the intent of forming glass. The study is intended to establish the best mix design which supports vitrification.

While vitrification typically represents an expensive technology to implement, it provides many benefits such as improved immobilization of hazardous contaminants within a glass matrix and a significant reduction in waste volume.

The Remedy Selection portion of stabilization treatability studies for vitrification is now in progress and is expected to be completed in June 1993.

Radon Sampling Program: Consistent with the terms of the U.S. EPA's 1991 National Emission Standards for Hazardous Air Pollutants (NESHAP) Federal Facility Agreement, a sampling program was initiated in the waste pit area to measure the level of radon being released from the waste pits. The program involved a one-time measurement of radon release using Large Area Activated Charcoal Collectors (LAACC). Approximately 100 LAACCs were placed on Waste Pits 1, 2 and 3. The LAACCs were left on the pits for 24 hours, removed and then sent to an off-site laboratory for analysis. Analytical results show radon levels on all three waste pits are well below the emission limit of 20 picocuries per square meter per second, the federal standard established by the U.S. EPA's NESHAP. The average levels calculated for Pits 1, 2 and 3 are 9.1, 6.4, and 2.6 picocuries per square meter per second, respectively. These measurements are deemed representative of the long-term average radon emissions that can be expected from the three waste pits.

Measurements will be conducted to verify that radon emissions from Pit 4 are insignificant due to the synthetic and clay cover. Radon monitoring for Pit 4 is scheduled to take place in November 1992. No measurements will be required on Pit 5, because all exposed material in Pit 5 will be distributed to below the water level as part of Removal Action No. 18 (Control Exposed Material in Pit 5). This work is proceeding on schedule. Pit 6 was not identified as a potential radon source, due to the insignificant radium-226 levels in Pit 6 waste and the water cover. No measurements will be required on the Clearwell due to its water cover.

Reports: The compilation of Operable Unit 1 Remedial Investigation and Feasibility Study reports is proceeding consistent with the schedules set forth in the 1991 Amended Consent Agreement. Validated analytical data has been received and development of the Baseline Risk Assessment is in progress. This risk assessment characterizes existing and potential threats to human health and the environment from Operable Unit 1 waste facilities. Information from the risk assessment will be incorporated into the Remedial Investigation (RI) report for Operable Unit 1, which is due to U.S. EPA in October 1993.

Removal Actions

Waste Pit Area Runoff Control (Removal Action No. 2): This completed Removal Action provided a system for the collection and treatment of potentially-contaminated stormwater runoff from the waste pit area to prevent it from reaching Paddy's Run Creek.

This Removal Action provides runoff control, as well as a collection system, designed to collect stormwater runoff from the waste pit area and allow it to pass through the Fernald site's existing wastewater treatment system prior to discharge to the Great Miami River.

Completion of this project and the continued operation of the existing Stormwater Retention Basin will result in the capturing of a significant amount of additional stormwater runoff from the Fernald site, thus minimizing the potential for release of contaminants to the environment.

Control Exposed Material in Pit 5 (Removal Action No. 18): The objective of this Removal Action is to eliminate the possibility of airborne contamination resulting from exposed materials in the pit. The Removal Action will involve the repositioning of the exposed waste materials within the pit to provide for a continuous water cover over the residues. Dredging was selected as the method of repositioning the material within Pit 5. Conditional approval of the work plan was granted by U.S. EPA, and U.S. EPA comments were incorporated into the work plan. Field work was initiated September 28, 1992. This project is on schedule for completion by December 21, 1992. The DOE will be accepting public comments on this Removal Action during the month of November 1992. The work plan is available for review in the Public Environmental Information Center.

Waste Pit Area Containment Improvement (Removal Action No. 22): This Removal Action is designed to minimize the potential for wind or water erosion of contaminated materials from access roads and exposed surfaces in the Operable Unit 1 area. The work plan was submitted to the U.S. EPA August 31, 1992, for review. The work plan was disapproved by the U.S. EPA on October 5, 1992, pending incorporation of U.S. EPA comments. DOE responses to comments are due back to the U.S. EPA by November 5, 1992. This Removal Action will include revegetation (seeding) of the pit area for erosion control, and regrading of some existing stormwater ditches in the pit area to promote positive drainage. Based on an agreement between the DOE, U.S. and Ohio EPAs, the DOE initiated revegetation of the exposed areas on October 20, 1992. The DOE will be accepting public comments on this Removal Action during the month of November 1992. The work plan is available for review in the Public Environmental Information Center.

Other Activities:

Minimum Additive Waste Stabilization: The DOE continues to conduct a Minimum Additive Waste Stabilization (MAWS) program at Fernald in conjunction with Argonne National Labs, GTS Duratek, Lockheed Environmental Systems, and The Catholic University of America. The MAWS program is an innovative approach to combining vitrification, water treatment, and soil washing processes to potentially save millions of dollars in remediation costs through achieving waste minimization. The purpose of the program is to demonstrate that the MAWS program as applied to vitrification may be an economical treatment alternative for the large volumes of low-level radioactive and mixed wastes present at Fernald. It would probably need to be combined with other technologies.

The MAWS program is designed to blend waste materials with contaminated soils and thermally react them into a stable glass form for safe and permanent disposal. Vitrification results in a significant net reduction in the total volume of waste requiring permanent storage. Laboratory tests have shown that wastes from some of Fernald's waste pits, when vitrified by themselves, do not make a good glass. However, when these pit wastes are blended with contaminated soils in correct proportions, tests have shown that a good, stable glass at reduced volume is achievable.

While vitrification has an initial higher capital cost than cementation (stabilizing waste with cement), in the long run a cost savings might be realized because cementation adds to the total volume of waste that must be disposed of properly. Vitrification results in significant reductions in net volumes of waste and the MAWS concept eliminates or minimizes costly additives that otherwise would be required.

Presently, The Catholic University of America, in cooperation with the DOE, is conducting laboratory-scale vitrification studies on samples taken from Operable Unit 1 waste materials. The MAWS bench-scale demonstration will process 0.3 to 1 metric ton of glass per day, and provide scale-up parameters for a pilot unit designed to process 20 metric tons per day. Eventually, full-scale facilities could be constructed to process glass at a rate of approximately 300 metric tons per day.

Construction activities are in progress to house MAWS equipment in Plant 9 at Fernald. Installation of MAWS equipment is scheduled for completion in April 1993. This equipment includes a soil washing unit, a melter with an off-gas system, and a water treatment system. After the equipment is installed, test runs of the process will be initiated. Then, following approval of the safety/health and work plans, bench-scale work will be initiated to process glass from Pit 5 waste blended with contaminated soils.

This process will yield three effluent streams: 1) clean water; 2) clean soil, and 3) glass. The glass will be made into the form of gems which look like squashed marbles. This shape was chosen because gems can be made quickly and are easily handled in bulk amounts.

GTS Duratek and The Catholic University of America are presently installing a 100 kilograms/per day glass melter on the campus of The Catholic University of America as part of the MAWS program. This melter is expected to be operational in November 1992. Data regarding the safety, efficiency, and operation of the 100 kilograms/per day glass melter will be used to support the design criteria and approval documentation necessary for startup of the 300 kilograms/per day glass melter in the spring of 1993.

Cleanup Alternatives

Five alternatives to cleanup the waste pit area have been identified.

The first alternative would involve stabilizing the waste in place, removing and treating standing water, and construction of a slurry wall, subsurface drains and a groundwater extraction system. This alternative would leave the waste in place, but would provide treatment of the waste and a system to

prevent contamination from migrating into the groundwater.

The second alternative would involve removing the waste, contaminated soils and liner materials that surround the pits, from their current location, and stabilizing or treating the waste, treating and discharging standing water, and permanent disposal of the stabilized/treated waste in an engineered structure at the Fernald site.

The third alternative is identical to the second, but with permanent disposal at an off-site facility.

The fourth alternative is similar to the second alternative and would involve removing the waste from the pits, but leaving in place and capping the contaminated soils and liner materials that surround the pits.

The fifth alternative is the same as the fourth alternative except the soils would be treated in place prior to capping.

More information about Operable Unit 1 is available in the Public Environmental Information Center (PEIC), where Fernald Project cleanup documents are kept in the Administrative Record. The PEIC is located in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030. The telephone number is (513) 738-0164.