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PROGRESS REPORT OPERABLE UNIT 1 WASTE PIT AREA FEBRUARY 1993

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Fernald Project Remedial Investigation/ Feasibility Study

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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 Operable Unit 1 are complete. This information is required to complete the study on Operable Unit 1.

All samples were analyzed at U.S. EPA-approved laboratories to determine the concentration of radiological and chemical constituents in Operable Unit 1. Some data collected prior to beginning the study must still be validated. That is expected to be completed in March 1993.

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.

Materials from the pits are being used to test waste treatment technologies (called treatability studies). Solidification (stabilizing the waste with cement or polyethylene) and vitrification (transforming the waste into glass) are being tested.

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

Composite samples (blended samples that 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 specific locations within the waste unit) to provide process information, including the relative ability of the technology to treat the range of waste types and forms in a particular pit.

Cement Stabilization

Cement stabilization tests involve mixing quantities of waste pit materials with differing amounts of cement and cement additives. Remedy Screening studies have been completed. They show that the waste is suitable for cementation.

The Remedy Selection portion of the test is now in progress and is expected to be completed in July 1993.

As part of these tests, each of the cement mixtures is subjected to a series of physical and chemical tests, such as leaching the waste in acid, to determine which cement mix design has the best ability to retain its physical form and stabilize the waste.

Vitrification studies

Vitrification tests involve mixing samples from each of the waste units with a range of materials, including fly ash, and heating them in furnaces to form glass. The Remedy Screening portions of vitrification tests are complete. They show the waste is suitable for vitrification. The study will find the best mix design.

Initial results indicate that vitrification can be economically competitive. From a life cycle or overall cost standpoint, it will provide a final waste form that significantly reduces waste volumes while also reducing the mobility and toxicity of the hazardous constituents.

The Remedy Selection portion of the tests is now in progress and is expected to be completed in June 1993.

Laboratory-scale Remedy Design treatability testing is progressing at GTS Duratek and Catholic University of America with the operation of a 100 kilograms/per day glass melter located on the campus of Catholic University.

Encapsulation studies

A relatively new encapsulation technology, polymer encapsulation, is being investigated. This technique uses commonly available non-toxic plastics such as polyethylene (the same material used in milk and food containers) to securely surround and bind together particles of dried waste material. The bound and stable waste is then either pressed or extruded into solid forms prior to disposal.

Some of the characteristics that make this technology attractive are: 1) its use of inexpensive, recycled, readily available non-toxic materials; 2) its safe and impact resistant form for shipping; 3) it can be made in any size and shape according to shipping and disposal requirements; and 4) it appears to be tolerant of a large range of waste composition.

The resulting waste form is lighter than many other waste forms which are more dense; however, this reduced density corresponds to an increase in waste volume.

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

Control Exposed Material in Pit 5 (Removal Action No. 18): The objective of this Removal Action was to eliminate the possibility of airborne contamination resulting from exposed materials in the pit. Exposed waste materials were repositioned within the pit so they would be covered by water. This prevents them from being blown by the wind. Dredging was completed December 16, 1992. Other field activities, including patching separations in the pit liner, were completed in January 1993, ahead of the scheduled completion date of February 3, 1993.

Waste Pit Area Containment Improvement (Removal Action No. 22): This Removal Action is designed to reduce 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 approved with comments by the U.S. EPA December 4, 1992. U.S. EPA comments have been incorporated into the final work plan. Ohio EPA approval was received December 7, 1992. The south berm of Pit 4 will be stabilized. Drainage ditches along Pits 3, 4, 5, and 6 will be regraded. Roads between Pits 3, 4, 5, and 6 will be resurfaced. The pit area has been reseeded for erosion control. Some existing stormwater ditches in the waste pit area are being regraded to promote drainage. This Removal Action is on schedule for completion by August 1993.

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 combines vitrification, water treatment, and soil washing processes to reduce waste volume and cost. 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.

The MAWS program blends waste with contaminated soils and melts them into a stable glass

form. Vitrification significantly reduces the volume of waste requiring permanent storage. Laboratory tests have shown that wastes from some of Fernald's waste pits do not have all the components necessary to make glass. However, when these pit wastes are blended with contaminated soils in correct proportions, tests have shown that a good, stable glass can be made.

Construction activities are in progress to house MAWS equipment in Plant 9 at Fernald. Installation of MAWS equipment is on schedule for completion in April 1993.

Following approval of the safety, health and work plans, bench-scale work will begin to process glass from Pit 5 waste blended with contaminated soils. U.S. and Ohio EPA comments have been incorporated into the work plan. Final approval of the work plan from the U.S. EPA and Ohio EPA is expected in April 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.