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OPERABLE UNIT 4 SILOS 1-4 - OCTOBER 1994 - FACTSHEET

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FERNALD
Environmental Management Project

Remedial Investigation/ Feasibility Study

PROGRESS REPORT OCTOBER 1994

Operable Unit 4
SILOS 1-4

Randi Allen
DOE Manager,
Operable Unit 4
648-3102

Introduction

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's (DOE) 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 is 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 "removal actions," are initiated when there is a need to accelerate cleanup activities to address releases or potential releases of hazardous substances. All removal actions at Fernald are coordinated with the U.S. EPA and the Ohio EPA.

Presently, there are no removal actions taking place within Operable Unit 4. Three removal actions have been successfully completed: bentonite installation in Silos 1 and 2 (November 1991); decant sump tank (April 1991); and Silo 3 hopper and assembly removal (January 1992).

Following is a progress report on Operable Unit 4, including its history, the current status of RI/FS activities, and a description of the preferred cleanup alternative.

Background

K-65 Silos 1 and 2 contain radium-bearing radioactive wastes dating back to the 1940s. The two silos were reinforced with an earthen berm in 1964, and the berm was upgraded in 1983. Other past improvements include a 30-foot cap installed on top of the silo domes for added protection, and a polyurethane foam coating that was applied over the domes for weather protection. A radon treatment system was constructed, and radon gas monitors were installed around the Fernald site boundary and in the immediate vicinity of Silos 1 and 2. Silo 3 contains dried uranium-bearing wastes, and Silo 4 is empty.

RI/FS Activities

Site Characterization: All site characterization activities associated with the Operable Unit 4 RI/FS have been completed. Data from the analyses of collected samples have been received and validated. The data have been compiled in Remedial Investigation (RI) and Feasibility Study (FS) reports.

Field activities included the completion of borings in the berms surrounding the silos, the soils beneath the silos, and the contents of the concrete structures. Above-background concentrations of radionuclides and other contaminants have been identified in surface and subsurface soil, sediment and surface water, and groundwater within and adjacent to the Operable Unit 4 study area.

Reports: In January 1994, the final RI report for Operable Unit 4, including all validated analytical data from sampling activities, was conditionally approved by the U.S. EPA and Ohio EPA. The RI report provides details about the

nature and extent of contamination in Operable Unit 4 and establishes remedial action objectives.

The RI report also includes the Operable Unit 4 Baseline Risk Assessment, which evaluates pathways and the extent of exposure for existing conditions prior to any remedial activities in Operable Unit 4. Based on results of site investigations and risk calculations, the risks associated with Operable Unit 4 exceed generally-accepted regulatory thresholds, thereby necessitating implementation of remedial actions.

Fernald's Sitewide Environmental Impact Statement (EIS), which addresses requirements of the National Environmental Policy Act (NEPA) and includes the NEPA Cumulative Impact Analysis, was integrated into the FS and issued as an appendix. The Sitewide EIS evaluates the leading remedial alternatives for all five of Fernald's operable units and the environmental impacts associated with them. The intent was to issue Fernald's first FS report as an integrated document that satisfies both NEPA and CERCLA requirements. The integrated document is called a Feasibility Study/Environmental Impact Statement.

In support of the FS development, two U.S. EPA-approved treatability study programs were completed. One addressed cementation and chemical extraction technologies for Operable Unit 4 silo wastes; the other addressed vitrification of Operable Unit 4 waste materials. These technologies were tested to provide information to support determination of the technology providing the most environmentally sound, cost-effective and implementable method for treating the wastes prior to final disposal.

Results of the treatability studies are contained in the FS report for Operable Unit 4. Viable remedial action alternatives evaluated are discussed in the FS report for Operable Unit 4, which was submitted to U.S. EPA ahead of schedule in September 1993. In May 1994, U.S. EPA approved the final FS report for Operable Unit 4, pending resolution of EPA comments.

In September 1994, DOE submitted its Proposed Plan for Remedial Action for Operable Unit 4 to U.S. EPA. The Proposed Plan identifies an initial preference for vitrification of the contents removed from Silos 1, 2, and 3, as well as the decant sump tank sludge, and shipping the vitrified material to the Nevada Test Site for disposal.

Silo demolition debris and contaminated soils excavated in the vicinity would be stored at the Fernald site on an interim basis in a manner consistent with the approved work plan for Improved Storage of Soil and Debris (Removal Action No. 17).

Public Comment Period Extensions

The Operable Unit 4 Feasibility Study/ Proposed Plan-Draft Environmental Statement (FS/PP-DEIS) was issued for public comment in March 1994. This public comment period originally was scheduled to end April 20, 1994. However, it was extended until May 20, 1994, in response to a request by the Citizens' Advisory Board (CAB) for the Nevada Test Site. CAB was formed in March 1994 to assist DOE-Nevada in addressing stakeholder concerns. A second 30-day extension to the Operable Unit 4 FS/PP-DEIS public comment period (until June 19, 1994) was granted to allow the CAB additional time to review these documents.

Proposed Draft Record of Decision for Remedial Actions

As a result of the two public comment period extensions, U.S. EPA extended the date for DOE to submit its Proposed Draft Record of Decision for Remedial Actions at Operable Unit 4 to August 9, 1994. The Proposed Draft Record of Decision documents the selected remedy for Operable Unit 4.

DOE submitted its Proposed Draft Record of Decision on August 8, 1994. On September 6, 1994, DOE received U.S. EPA's conditional approval of the document, pending resolution of EPA comments.

On September 14, 1994, DOE requested a 30-day extension for submitting the Final Record of Decision for Remedial Actions at Operable Unit 4. The extension was requested to accommodate the NEPA-required, procedural 30-day waiting period, which ends October 22, 1994. Assuming approval of the extension, the revised DOE-approved document will be transmitted to U.S. EPA on or before November 4, 1994.

Major components of the selected remedy for Operable Unit 4 include:

* Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.

* Vitrification (glassification) to stabilize the residues and sludges removed from the silos and decant sump tank.

* Shipment of the vitrified contents of Silos 1, 2, 3, and the decant sump tank for disposal at NTS.

* Demolition of Silos 1, 2 3 and 4, and decontamination -- to the extent practical -- of concrete rubble, piping, and other construction debris generated.

* Removal of the earthen berms and excavation of contaminated soils within the Operable Unit 4 boundary to achieve proposed remediation levels. Placement of clean backfill following excavation.

* Segregation of non-contaminated soils and demolition of the vitrification treatment unit and associated facilities after use. 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 Improved Storage of Soil and Debris (Removal Action No. 17).

* Pumping and treatment of any contaminated perched water encountered during remedial activities.

Other Activities

Minimum Additive Waste Stabilization (MAWS): The MAWS program combines vitrification (transforming waste into glass), water treatment and soil decontamination processes, into an integrated system for treatment of waste. Fernald's MAWS equipment includes a soil decontamination unit, a melter with an off-gas treatment system, and a water treatment system.

The MAWS program is designed to blend waste materials with contaminated soils and, through the use of electricity, melt them into a stable glass form which is safe for permanent disposal. This process yields three effluent streams: clean water, clean soil, and glass that contains the original contaminants.

The soil decontamination process separates contaminated soils into clean and contaminated portions. The contaminated portion is blended with other wastes (such as Fernald pit wastes) and melted into a stable glass form. The clean portions can be used as excavation backfill as needed at Fernald.

In April 1994, the MAWS system successfully completed the washing of 100 cubic yards of uranium-contaminated soil from Fernald's Plant 1 Pad Continuing Release Removal Action.

Since July 27, 1994, the MAWS vitrification system has completed three continuous runs ranging from six to 13 days each. Thorium-contaminated mixed waste sludge from Waste Pit 5 was combined with soil washing residue and turned into glass gems.

Vitrification Pilot Plant

The Operable Unit 4 Vitrification Pilot Plant project consists of the design, construction, and operation of a one-metric-ton-per-day output facility for vitrification of K-65 Silos 1 and 2 and Silo 3 material. The pilot-scale vitrification plant will include equipment for retrieving waste from the silos and an off-gas treatment system. The project will be conducted in two phases.

Phase I will demonstrate operability of all Vitrification Pilot Plant equipment using non-radioactive surrogate materials. Phase I will involve loading bentonite and surrogate materials into Silo 4 for demonstration of waste retrieval technologies. From Silo 4, the surrogate material will be transported to the vitrification facility for processing. Prior to entering the vitrification furnace, metallic compounds will be added to the surrogate material to more closely simulate K-65 material. No surrogate material will be used to demonstrate Silo 3 material.

Phase I is estimated to require approximately 20-30 metric tons of surrogate material to adequately demonstrate vitrification, and approxi-

mately 1,500 metric tons to fully demonstrate waste retrieval.

Phase I engineering is nearing completion; construction of the Vitrification Pilot Plant began July 17, 1994. Phase I testing is scheduled to begin in May 1995 and will require approximately 30 days to complete.

Phase II will demonstrate the formation of acceptable vitrified waste at the rate of one metric ton per day. Phase II will involve hydraulic removal of K-65 material from Silo 2 and pneumatic removal of Silo 3 material, while using the existing radon treatment system to demonstrate radon control in the silo headspace. The off-gas treatment system in the vitrification facility also will treat radon gas given off during the vitrification process. Radon control at the silos and the vitrification facility's off-gas treatment are two independent systems.

Phase II is estimated to require approximately 20 metric tons of K-65 material and 10 metric tons of Silo 3 material. K-65 and Silo 3 material will be mixed at a predetermined ratio, then vitrified. Glass formulations, previously optimized by lab-scale testing, will be further optimized (if required) during pilot-scale testing.

Phase II design is scheduled to be complete by January 1995. Operations are scheduled to begin in October 1995 and will require approximately 40 days to complete.

For More Information

More information about Operable Unit 4 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. For information regarding PEIC operating hours and services, please call (513) 738-0164.