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OPERABLE UNIT 4 - FERNALD RESIDUES VITRIFICATION PLANT PROJECT - DECEMBER 1995

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FACT SHEET

Operable Unit 4

Fernald Residues Vitrification Plant Project

December 1995

Introduction

The Fernald Residues Vitrification Project, also known as Operable Unit 4, is one of five well-defined areas undergoing remediation at the U.S. Department of Energy's (DOE) Fernald Environmental Management Project. The operable units were defined, based on their locations or the potential for similar technologies to be used in the ultimate cleanup.

Located at the western periphery of the Fernald site, Operable Unit 4 includes Silos 1 and 2 (K-65 Silos), Silo 3 (metal oxide silo), unused Silo 4, and ancillary structures. Operable Unit 4 remediation will address each of these structures, as well as any contaminated soils within the geographic boundary, and any contaminated perched water encountered during Operable Unit 4 remedial activities.

For each operable unit, the U.S. Environmental Protection Agency (EPA) issues a record of decision (ROD). The selected remedial action for an operable unit, as well as the basis for the selection, are formally presented in the ROD.

On Dec. 7, 1994, U.S. EPA signed the Record of Decision for Remedial Action at Operable Unit 4, in which the selected remedial action and the basis for selecting that particular remedial action, are presented.

Background

Silos 1 and 2, commonly called the "K-65 Silos," contain radium-bearing, low-level radioactive wastes dating back to the 1950s. In 1964, the two silos were reinforced with an earthen berm, which was upgraded in 1983.

Other improvements include a 30-foot cap installed on top of the silo domes for added protection and a polyurethane foam coating applied over the domes for weather protection. In addition, a radon treatment system was constructed, and radon 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. Silo 4 is empty.

Operable Unit 4 Selected Remedy

Major components of the Operable Unit 4 selected remedy 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, and 3, and the decant sump tank for disposal at the Nevada Test Site (NTS).

-- Demolition of Silos 1, 2, and 3 and 4, and decontamination -- to the extent practicable -- 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 17)*.

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

Operable Unit 4 Remedial Design and Remedial Action

The overall objective of Operable Unit 4 remedial actions is to safely remove a known source of contamination, which will reduce the potential for release of hazardous substances, including radionuclides, to the environment, thereby alleviating a potential risk to human health. Substantial risk reduction will be achieved by removing the sources of contamination, treating the material for which exposures result in the highest risk, shipping the treated residues off site for disposal, and managing remaining contaminated soils and debris consistent with a sitewide strategy.

Operable Unit 4 remedial actions entail removing the materials from Silos 1, 2, and 3 and treating them in a vitrification facility to be constructed at the Fernald site. Sludge from the decant sump tank, which collects liquids from in and around the silos, will also be removed and treated in the vitrification facility.

Vitrification (glassification) will reduce the mobility of hazardous constituents and will significantly reduce the volume of materials requiring disposal.

Following treatment, the vitrified residues will be containerized and transported and disposed at NTS. The Operable Unit 4 scope includes successful completion of these actions.

After the residues are removed from the silos, the concrete structures, radon treatment system and other structures within Operable Unit 4 will be demolished. After treatment, the vitrification facility will be disassembled.

Standard decontamination technologies will be applied, to the extent practical, to minimize the volume of waste requiring disposal. Opportunities for recycling materials will be explored.

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Contaminated soils within Operable Unit 4 will be excavated; it is anticipated that a minimum depth of 6 inches will be removed from the Operable Unit 4 area. Clean fill will be placed in excavated areas, which will then be seeded.

Contaminated Operable Unit 4 soil and debris will be placed in an on-site storage facility. As required, the storage facility will be maintained and monitored. Operable Unit 4 contaminated soil and debris will be disposed consistent with the selected remedial actions for Operable Units 3 and 5 and will be accomplished via the Soils Remediation Project.

On Oct. 6, 1995, DOE submitted the *Work Plan for Operable Unit 4 Remedial Action -- Phase I* to U.S. EPA. On Nov. 20, 1995, DOE received conditional approval, with comments from U.S. EPA. The *Work Plan for Operable Unit 4 Remedial Action -- Phase I* identifies the implementation strategy and schedule for completion of all remedial activities in the Operable Unit 4 ROD.

Phase I of the Operable Unit 4 remedial action work plan focuses on implementation of the initial remedial action in support of the construction of the Fernald residues vitrification plant:

-- Site preparation/underground utilities;
-- Silo superstructure construction;
-- New radon treatment system construction (Silos 1 and 2).

Phase II of the remedial action work plan will be submitted separately following integration of test data from the pilot-scale vitrification plant.

Construction of Fernald's pilot-scale vitrification plant began July 17, 1994, and is expected to be completed in January 1996. Operation of this facility supports development of final vitrification processes and design of the full-scale vitrification facility.

Operable Unit 4 Vitrification Pilot Plant Treatability Study

A vitrification pilot plant treatability study will be conducted in two phases to demonstrate integration of equipment and operation of the vitrification pilot plant including the melter off-gas system, and radon absorption system.

Other treatability study objectives include: verification of formulations developed from the previous bench-scale studies and glass-development program, production of a satisfactory glass product during full-scale operation, and insurance of compliance with acceptance criteria required for disposal at NTS.

Phase I operations will verify the adequacy of the equipment and process. Bentonite and nonradioactive surrogate materials will be utilized in the vitrification facility to perform integrated system operability testing prior to operating with actual silo residues. The surrogate materials are composed of chemicals, including silica, borax and alumina, to closely duplicate the actual silo materials.

Phase I testing with nonradioactive, surrogate materials is expected to begin in March 1996 and will take approximately 10 months to complete.

Production of approximately 90 metric tons of glass is expected to be required to adequately demonstrate vitrification.

For More Information

Contact the Public Environmental Information Center (PEIC), located at 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030 (phone: 513-738-0164).

For specific questions regarding Operable Unit 4, contact: Randi Allen, DOE Fernald Area Office Operable Unit 4 branch chief, 513-648-3102.

During Phase II, radioactive materials from Silos 2 and 3 will be utilized. Also radon control for the Silos 1 or 2 headspace and off-gas treatment for the vitrification facility will be demonstrated. Silo 2 materials will be removed by a manually operated slurry pumping device suspended from a mobile crane. This device will be deployed through an existing manway. A glovebag will be used to maintain a seal and prevent radon escape into the atmosphere.

Silo 3 materials will be removed pneumatically.

Estimates for Phase II production are that approximately 30 metric tons of glass from K-65 material and 15 metric tons of glass from Silo 3 material will be required.