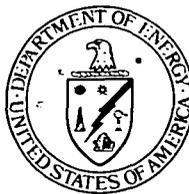


5653

**PROGRESS REPORT OPERABLE UNIT 5 ENVIRONMENTAL MEDIA JUNE
1994**

06/14/94

DOE-FN PUBLIC
5
FACTSHEET



FERNALD

Environmental Management Project

Remedial Investigation/ Feasibility Study

5659

PROGRESS REPORT

JUNE 1994

Operable Unit 5 ENVIRONMENTAL MEDIA

Randi Allen
DOE Manager,
Operable Unit 5
648-3102

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 when 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 5 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 5 encompasses the environmental media at the Fernald site and surrounding areas that could be impacted by the facility. While other Operable Units focus on specific waste facilities or defined areas, Operable Unit 5 is concerned with those environments that could be affected by the Fernald site.

"Environmental media" includes the groundwater including perched water, surface water, soils, sediments, vegetation and wildlife throughout the Fernald site and surrounding areas. The groundwater includes the Great Miami Buried Valley Aquifer, a source of water in the vicinity of the Fernald site. Surface waters include the Great Miami River, Paddy's Run, and the Fernald site's storm sewer outfall ditch. Sediments in Operable Unit 5 include solid materials carried in stormwater runoff or plant effluent discharges to surface waters or drainage ditches. Soils on and off the Fernald property boundaries also are being investigated for possible contamination due to past discharges or air emissions.

RI/FS Activities

Field Activities: In the fall of 1993, Operable Unit 5 completed all planned field investigations needed to support the identification of the nature and extent of chemical and radiological contamination in soils, sediments, surface water, groundwater, and perched groundwater. These investigations were needed to support development of the Operable Unit 5 Remedial Investigation (RI) report, which is scheduled to be submitted to the U.S. EPA and the Ohio EPA in June 1994 for review and comment.

Field activities in 1993 included the sampling of over 300 monitoring wells located on and off the Fernald property to enable DOE to assess current contamination conditions throughout the total contamination area. This "snapshot" of current conditions will help facilitate the groundwater modeling and risk assessment elements of the RI report. In addition to the snapshot well sampling program, seven other site characterization

programs were completed during 1993 in preparation for the RI report:

- Fernald Trap Range Investigation
- Great Miami Riverbank Investigation
- Pilot Plant Drainage Ditch Seepage and Surface Water Background Investigation
- Additional Surface and Subsurface Soil Sampling
- Additional Monitoring Well Installation and Well Abandonment
- Glacial Overburden Hydraulic Investigation
- Southwest Field Area Investigation

Completion of these programs resulted in the collection of over 5,200 new environmental datapoints, providing a more complete and accurate picture of current contaminant conditions. The data generated from these new samples are being compiled along with other existing data for inclusion in the RI report.

Modeling

Groundwater modeling is a key tool scientists have available to help them make long-term predictions of how contaminants could move through the soil and groundwater. The models are made up of mathematical formulas that use data collected during the RI/FS investigation to simulate current environmental conditions. By using models, scientists can project future contamination levels and their associated risks under different cleanup options for up to 1000 years. For example, the models can predict what groundwater quality will be in 500 years if contaminated soil is removed today, if the contaminated groundwater is pumped from the aquifer, or if cleanup actions are not taken. Then regulators and others can compare future risks associated with each remedial alternative to help them decide which remedial alternative to select.

The results of the modeling will be presented in the Operable Unit 5 RI report.

Reports

Preparation of the Operable Unit 5 RI report is proceeding on schedule for delivery to the U.S. EPA and Ohio EPA in June 1994. The report will present over 200 contour maps of contaminant distributions in both soils and

groundwater throughout the Operable Unit 5 study area. These maps form the basis for developing and evaluating remedial alternatives for addressing the contamination present in these media.

In addition to presenting information on the nature and extent of contamination in the environmental media, the RI report will describe the physical characteristics of the study area; summarize all remedial investigation activities for air, surface water and sediments, surface soils, subsurface soils, groundwater, and biological resources; and present the results of all contaminant fate and transport modeling activities and the human health and ecological risk assessments.

U.S. EPA has conditionally approved a draft DOE report which characterizes background water quality for streams and groundwater in the vicinity of the Fernald site. This report compiled and statistically evaluated existing data to determine the concentrations at which chemicals and metals (including uranium) occur naturally in groundwater and surface water near the Fernald site. This information is being used to support RI/FS documents and risk assessments for all five operable units.

DOE also submitted a draft report to U.S. EPA in August 1993 which evaluated possible impacts and associated risks to ecological receptors at Fernald and surrounding areas from years of production. To prepare this screening level ecological risk assessment, Operable Unit 5 personnel established study areas based on habitat and the size of the home-range for the ecological receptors, evaluated the major fate and transport processes at Fernald, and looked at the various ways that ecological receptors come into contact with contaminants.

After preparing the screening level ecological risk assessment, Operable Unit 5 personnel concluded that — with few exceptions — contaminants associated with Fernald beyond the limits of the Operable Units 1-4 scheduled cleanup areas were not adversely impacting ecological receptors in the study areas. Additional data collected since the screening study will be reviewed to verify these conclusions. The sitewide ecological risk assessment — which is part of the Operable Unit

5 RI Report — will present the detailed evaluation of ecological risk.

Treatability Studies: A treatability study has been initiated to determine if soil washing is a viable alternative for cleaning the contaminated soil/sediments at Fernald. Treatability studies are prepared during the initial RI/FS stages to support the applicability of innovative technologies for environmental restoration. Bench scale studies were used to provide initial evaluation of this process. A pilot-scale soil washing unit was constructed at Fernald for providing further evaluation of the process. This operation began in June 1993. Data generated from this study will be evaluated and incorporated into the Operable Unit 5 Feasibility Study report. This information also will be shared with all DOE facilities through the Fernald Uranium Soils Integrated Demonstration program.

Removal Actions

Contaminated Water Beneath FEMP Buildings (Removal Action No. 1): This removal action was initiated to minimize the potential for uranium-contaminated groundwater to infiltrate the underlying aquifer from perched water zones located beneath some former production buildings. "Perched" water is present in isolated pockets within the layers of clay-rich glacial soils that exist above the Great Miami Buried Valley Aquifer in the Fernald area.

Perched water zones beneath Plants 2/3, 6, 8, and 9, are of concern due to the discovery of significant concentrations of uranium. In addition, it was determined that these waters also contained volatile organic compounds. To minimize the potential for the movement of contaminated water in these zones to the underlying aquifer, a series of pumping wells were installed to extract the perched groundwater.

A treatment system at Plant 8 uses activated carbon filters to remove volatile organic compounds from the extracted water. The water is then processed through Fernald's existing wastewater treatment system for the removal of uranium before discharge to the Great Miami

River. Treatment of perched groundwater will continue in this manner until the Advanced Waste Water Treatment system takes over this operation in early 1995.

5658

South Groundwater Contamination Plume (Removal Action No. 3): The purpose of this removal action is to protect public health by limiting access to the use of uranium-contaminated groundwater in an area south of the Fernald site. This removal action is broken into five parts.

Part 1 provides an alternate water source to an industry affected by the contamination plume. This portion of the project involved the installation of production wells outside the plume area and a water supply system to the affected industry. This action has been in operation since 1992.

Another affected industry, which uses a minimal amount of groundwater (currently using bottled water for drinking purposes), will be provided with an alternate water supply by being connected to the planned public water system.

Part 2 involves the installation of a hydraulic barrier to impede further migration of the off-property South Plume. This is accomplished via a groundwater recovery well system to extract and pump groundwater from the plume. The extracted water is transported through a force main pipeline back to the Fernald site for monitoring and subsequent discharge to the Great Miami River. The groundwater recovery well system became operational August 27, 1993.

Initially, the 5-well groundwater recovery system was pumped at a flow rate of 2,000 gpm (400 gpm per well). Analytical results of samples taken from monitoring wells south of the extraction wellfield in September-October 1993 showed an upward trend in the concentration of arsenic and phosphorous. Arsenic and phosphorous are contaminants present in the Paddys Run Road Site (PRRS) groundwater plume located south of the extraction wells and is not associated with the Fernald site. To address that situation, pumping rates were reduced from 2,000 gpm to 1500 gpm (300 gpm per well) in December 1993.

Following the reduction in pumping rates, monitoring has indicated that the 1,500 gpm

pumping rate is still effectively capturing the uranium plume. In addition, the monitoring has indicated that total arsenic trends are decreasing downward and are close to pre-pumping levels. Arsenic trends continue to be assessed through routine water quality sampling and analysis.

A performance assessment report covering the first quarter's performance history was submitted to the U.S. EPA and Ohio EPA in May 1994, as part of the system's "Design, Monitoring and Evaluation Program Plan" requirements.

A new effluent outfall pipeline also was installed under Part 2. Use of the Fernald site's original effluent outfall pipeline to the Great Miami River was discontinued due to its age and limited capacity to handle future flow. The new outfall pipeline parallels the original outfall pipeline to the Great Miami River.

Part 2 work also included increasing the pump-out capacity at the Stormwater Retention Basin to reduce the potential for future overflow of the basin. This work was completed in July 1993.

To address the low dissolved oxygen content of the extracted groundwater, an aeration facility also was constructed under Part 2.

Part 3 involves construction of an Interim Advanced Wastewater Treatment (IAWWT) system which is now operational. The advanced treatment provided by the IAWWT system removes additional uranium from existing site wastewater streams and, by doing so, reduces the amount of uranium discharged to the Great Miami River. This reduction in uranium more than compensates for the additional discharges of uranium from the South Plume and other removal actions.

Part 4 of the removal action involves groundwater monitoring and institutional controls to prevent the use of contaminated groundwater. This activity is being implemented through the Fernald site's existing Groundwater Monitoring Program, including frequent monitoring of private wells located near areas of known contamination. As a result of public concern over the detection of above-background levels of uranium in several homeowners' wells, DOE initiated additional measures beyond the scope of this agreed-to action. Bottled water was offered to any resident whose well indicated above-background levels of uranium contamination. This will continue until

the public water supply is installed in this area.

Part 5 involved additional groundwater investigations in the vicinity of the South Plume to identify the location and extent of any remaining contamination attributable to Fernald in the groundwater south (downgradient) of the recovery wells installed under Part 2. Because the U.S. EPA has issued a proposed limit of 20 parts per billion (ppb) for uranium in drinking water, the Part 5 investigation was intended to identify the location of the leading edge of the plume, and to evaluate whether the Part 2 wellfield would effectively capture the leading edge as defined by the 20 ppb concentration.

The initial phase of Hydropunching[®], and sampling of existing monitoring wells in the area downgradient of the wellfield indicated only one hydropunch sample exceeding 20 ppb.

The second phase, which is also complete, involved installation of a vertical set of monitoring wells staggered from the surface down to bedrock, located near the center of the extraction wellfield. These wells were intended to provide a vertical profile of the uranium at the wellfield. In addition, the wells were used to identify groundwater elevation changes during the South Plume pump test.

The third phase, completed in August 1993, involved the installation of two rows of monitoring wells and associated Hydropunching[®] immediately upgradient and downgradient of the well field. This effort is known as the 12 Well Program, and currently is being used to monitor groundwater contamination and measure operating levels.

Results from the Part 5 sampling indicate that the South Plume Recovery System is effectively containing the leading edge of the plume (groundwater exceeding 20 ppb of total uranium). Additionally, continuous monitoring of these wells has indicated that the recovery well system is not adversely impacting the Paddy's Run Road Site contaminant plume.

Advanced Wastewater Treatment System: Phases I and II of the Advanced Wastewater Treatment System (AWWT) project have been under construction since April 1993. The objective is to provide advanced treatment of stormwater runoff (Phase I) and wastewaters

generated as a result of conducting cleanup activities (Phase II) for removal of radionuclides prior to discharge from the Fernald site.

Construction activities in support of Phases I and II are scheduled to be completed in late 1994, with Phases I and II scheduled for operations to begin in early 1995.

In addition, preliminary engineering has been initiated to examine the viability of expanding the AWWT system to address groundwater removed as part of future remedial actions. These preliminary engineering efforts are focused on supporting development of the Operable Unit 5 Feasibility Study. More detailed engineering on the expansion of the AWWT to address future groundwater remedial actions is anticipated to be conducted following the issuance of the Feasibility Study later this year.

Other Activities

Supplemental Environmental Project: DOE has agreed to conduct a Supplemental Environmental Project with the objective of further reducing uranium discharges from the Fernald site to the Great Miami River. As part of this project, one additional Interim Advanced Wastewater Treatment unit was installed to treat 200 gallons per minute (gpm) of extracted South Plume groundwater. This system became operational in March 1994.

In addition, the lifespan of the existing IAWWT unit at the Stormwater Retention Basin will be extended and this unit will be converted to treat additional South Plume water. In March 1995, the treatment capacity of this unit will be increased from 300 gpm to 400 gpm. This effort is intended to further reduce uranium discharges.

Under the terms of the Supplemental Environmental Project agreement, Fernald also will utilize Phase I and II of the AWWT for South Plume water treatment when excess capacity is available. This measure is expected to

provide an additional average of 550 gpm of treatment capacity, and further reduce uranium discharges to the river.

Feasibility Study Analysis

The Operable Unit 5 Feasibility Study (FS) is on schedule for submittal to the U.S. EPA by November 16, 1995. Currently, four land use objectives are being used as the guide posts for developing remedial alternatives. These include: 1) full unrestricted use of groundwater and site land; 2) full unrestricted use of groundwater and a portion of site land made available for unrestricted use; 3) unrestricted use of off-site groundwater and a portion of site land made available for restricted surface use; and 4) unrestricted use of off-site groundwater and no site land made available for other uses.

Nineteen remedial alternatives ranging from no action to full restoration of all affected environmental media are under consideration in the FS to satisfy the land use objectives. DOE is presently assessing the volumes of contaminated environmental media that require restoration under the four land use objectives, to allow the development of accurate cost estimates among the alternatives.

As part of the Operable Unit 5 FS process, a Comprehensive Risk response Action Risk Evaluation (CRARE) is being developed, which will include the impacts of the other four operable units with the final cleanup goals for Operable unit 5.

For More Information

More information about Operable Unit 5 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.