UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Rec'd 12-27-06

REPLY TO THE ATTENTION OF:

DEC 21 2006

Mr. Johnny W. Reising
United States Department of Energy
Fernald Closure Project
175 Tri-County Parkway
Springdale, Ohio 45246

SR-6J

RE: Preliminary Close Out Report

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has completed its Preliminary Close Out Report (PCOR) for the United States Department of Energy's (U.S. DOE) Feed Materials Production Center. This document certifies that the site has met the CERCLA definition of construction complete. I have enclosed a copy of this document for your records.

Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

James A. Saric
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Con Murphy, Fluor Fernald
Frank Johnston, Fluor Fernald

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# Preliminary Close Out Report

# U.S. DOE Feed Materials Production Center

# Fernald, Ohio

Acronyms:

| | |
|---|---|
| ACA | Amended Consent Agreement |
| ARAR | applicable or relevant and appropriate requirements |
| AWWT | Advanced Wastewater Treatment |
| CAWWT | converted Advanced Wastewater Treatment facility |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| D&D | decontamination & dismantlement |
| U.S. DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| U.S. EPA | U.S. Environmental Protection Agency |
| ESD | explanation of significant differences |
| FCP | Fernald Closure Project |
| FEMP | Fernald Environmental Management Project |
| FERMCO | Fernald Environmental Restoration Management Company |
| FFCA | Federal Facilities Compliance Agreement |
| FMPC | Feed Materials Production Center |
| FRL | final remediation levels |
| IEMP | Integrated Environmental Management Plan |
| IROD | Interim Record of Decision |
| LM | Legacy Management |
| LMICP | Legacy Management and Institutional Controls Plan |
| mg/l | milligrams/liter |
| MUEF | Multi-Use Educational Facility |
| NLO | National Lead of Ohio |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| NTS | Nevada Test Site |
| OhioEPA | Ohio Environmental Protection Agency |
| OU | Operable Unit |
| O&MMP | operations and maintenance master plan |

| | |
|---|---|
| OSDF | On-site Disposal Facility |
| OSWER | Office of Solid Waste and Emergency Response (U.S. EPA) |
| PCOR | Preliminary Closeout Report |
| RA | Removal Action |
| RCRA | Resource Conservation and Recovery Act |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| SCQ | Site-wide CERCLA Quality Assurance Plan |
| $\mu$g/L | micrograms per liter |
| WAC | waste acceptance criteria |
| WEMCO | Westinghouse Environmental Management Company of Ohio |
| WMCO | Westinghouse Materials Company of Ohio |

## 1.0 INTRODUCTION

This Preliminary Close Out Report (PCOR) documents that the U.S. Department of Energy (U.S. DOE) has substantially completed all major construction activities for the U.S. DOE Feed Materials Production Center Superfund site (OH6890008976) also know as the Fernald Closure Project (FCP). The PCOR has been prepared in accordance with the U.S. Environmental Protection Agency (U.S. EPA) guidance included in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9320.2-09A-P, Closeout Procedures for National Priorities List Sites (January 2000). U.S. EPA and its contractor Tetra Tech EMI conducted a pre-final inspection on November 1, 2006. Also in attendance were representatives from the Ohio Environmental Protection Agency (OhioEPA) and U.S. DOE. With the exception of punch list items that are being addressed the FCP has completed the construction activities in accordance with the Remedial Design (RD) plans for all Operable Units (OU). Further, construction associated with the ongoing remedial activities associated with the groundwater remedy and the On-Site Disposal Facility (OSDF) have been completed in accordance with the respective RD plans and specifications.

Remediation of the contaminated groundwater is ongoing. The construction of the necessary infrastructure to implement the continued groundwater remedy stipulated in the Operable Unit 5 Record of Decision was completed in October 2006. Completion of the final cap system of the OSDF also occurred in October 2006. Physical completion of the entire FCP was achieved on October 29, 2006.

## 2.0 SUMMARY OF SITE CONDITIONS

The FCP is a 1050-acre government-owned contractor-operated facility located in southwestern Ohio approximately 18 miles northwest of downtown Cincinnati. The facility is located just north of Fernald, Ohio, a small farming community, and lies on the boundary between Hamilton and Butler counties. Of the total site area, approximately 852 acres are in Crosby Township in Hamilton County and 200 acres are in Ross and Morgan Townships in Butler County. More information can be found at www.fernald.gov.

The Atomic Energy Commission (AEC), predecessor to the U.S. Energy Research and Development Administration (ERDA) and then U.S. DOE, established the Feed Materials Production Center (FMPC) in conformance with AEC orders in the early 1950s. In 1951, National Lead Company of Ohio, Inc., (now NLO) entered into a contract with the AEC as the Management and Operations Contractor for the facility. This contractual relationship lasted until January 1, 1986. Westinghouse Materials Company of Ohio (WMCO), a wholly owned subsidiary of Westinghouse Electric Corporation, then assumed management responsibilities for the site operations and facilities. In 1991, Westinghouse renamed this subsidiary the Westinghouse Environmental Management Company of Ohio (WEMCO). During that same year, U.S. DOE renamed the site the Fernald Environmental Management Project (FEMP) to reflect the site's revised mission. On December 1, 1992, Fernald Environmental Restoration Management Company (FERMCO) (now Fluor Fernald) assumed responsibility for the site as the Environmental Restoration Management Contractor for U.S. DOE. The FEMP was renamed the FCP on January 27, 2003.

## 2.1 Operating History

The primary mission of the FMPC during its 37 years of operation was the processing of uranium feed materials to produce high purity uranium metals. These high purity uranium metals were then shipped to other U.S. DOE or U.S. Department of Defense facilities for use in the nation's weapons program. Manufacture of the uranium metal products generally occurred in seven of the FMPC's more than 50 production, storage, and support buildings that comprised what was known as the 140-acre production area. During the 37 years of production operations, nearly 500 million pounds of uranium metal products were produced. The site also served as the nation's key federal repository for thorium-related nuclear products, and it also recycled uranium used in the reactors at the Hanford site.

In accomplishing the site mission, liquid and solid wastes were generated by the various operations between 1952 and 1989. Before 1984, solid and slurried wastes from FMPC processes were deposited in an on-property waste storage area. This area, located west of the former production area, included six low-level radioactive waste storage pits, two earthen-bermed concrete silos containing K-65 residues, one concrete silo containing metal oxides, one unused concrete silo, two Lime Sludge Ponds, a Burn Pit, a Clearwell, and a Solid Waste Landfill. After 1984, wastes generated from operations were containerized for eventual shipment to off-site disposal facilities. Contaminants from material processing and related activities were released into the environment through air emissions, wastewater discharges, storm water runoff, and leaks and spills. The FMPC was included on the National Priorities List on November 21, 1989 (54 Federal Register 48184).

## 2.2 Regulatory History

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) process at the FEMP began in 1986, in accordance with a Federal Facility Compliance Agreement (FFCA) between DOE and the EPA to cover environmental impacts associated with the FMPC. The FFCA was intended to ensure that environmental impacts associated with activities at the facility would be thoroughly and adequately addressed. In response to the FFCA, a site-wide RI/FS was initiated pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). Production operations at the facility were suspended in 1989 and the facility was placed on the National Priorities List. The FFCA was amended in 1990 by a Consent Agreement (under §120 106[a] of CERCLA) that revised the milestone dates for the RI/FS and provided for implementation of removal actions. The Consent Agreement was amended in September 1991 to revise schedules for completing the RI/FS process. The ACA provided for implementation of the operable unit concept. The FMPC was partitioned into five operable units to promote a more structured and expeditious cleanup. The schedule for preparation of a remedial investigation report and feasibility study report for each operable unit was included in the ACA. Further, the ACA included requirements for completing all RD/RA activities.

The Ohio EPA Office of Federal Facilities Oversight also oversees cleanup activities at the site as a support agency primarily through the December 1988 Consent Decree and its January 1993 Amendment. Ohio EPA conducts environmental monitoring, public outreach, restoration and remediation oversight at the FCP, as well as maintaining authority for Resource Conservation Recovery Act (RCRA) enforcement. The 1996 Director's Final Findings and Orders (DF&O) between the DOE/Fluor Fernald and the Ohio EPA provide orders for closure activities relative to several Hazardous Waste Management Units (HWMUs) established at the site to satisfy both RCRA and CERCLA requirements.

## 2.3 Sitewide Operable Units and Cleanup Strategy

For purposes of investigation and study, the remedial issues and concerns that were similar in location, history, type/level of contamination, and inherent characteristics were grouped into operable units under the 1991 ACA. Specifically, the site was divided into five Operable Units (OU). Four of the OUs (1 through 4) are considered contaminant "source" OUs as they represent the physical sources of contamination that have affected the site's environmental media. OU 5 is considered the "environmental media" OU as it represents the environmental media affected by past production operations and waste disposal practices (i.e., beyond the contaminant "source" OU boundaries), as well as the pathways of contaminant migration at the site. The four contaminant "source" OUs and the environmental media operable unit are described below:

- Operable Unit 1: Waste Pit Area. Waste Pits 1 through 6. Clearwell, Burn Pit, berms, liners, and affected soil residing within the operable unit boundary.
- Operable Unit 2: Other Waste Units. Flyash Piles, other South Field disposal areas, Lime Sludge Ponds, Solid Waste Landfill, berms, liners, and affected soil residing within the operable unit boundary.
- Operable Unit 3: Former Production Area. Former production and production-associated facilities and equipment (including all above- and below-grade improvements), including, but not limited to, all structures, equipment, utilities, drums, tanks, solid waste, waste, product, thorium, effluent lines, a portion of the K-65 transfer line, wastewater treatment facilities, fire training facilities, scrap metal piles, feedstocks, and coal pile. Note that all affected soil beneath the facilities falls within Operable Unit 5.
- Operable Unit 4: Silos 1 through 4. Contents of Silos 1, 2, 3 (Silo 4 has remained empty); the silos structures, berms, decant sump tank system, and affected soil residing within the operable unit boundary.
- Operable Unit 5: Environmental Media. Affected groundwater, surface water, soil not included in the definitions of Operable Units 1, 2, and 4, sediment, flora and fauna.

During the time period 1994 to 1996, U.S. DOE and U.S. EPA signed the final RODs for each OU – in cooperation with the Ohio EPA and the Fernald Citizen's Advisory Board – which set in motion the major cleanup requirements and approaches that collectively define the FCP cleanup. The RODs employ a combination of off-site and on-site disposal, under which an estimated 77 percent of the remedial waste volume (the site's lower concentration, higher volume materials) would be disposed in the engineered OSDF while approximately 23 percent (the site's higher concentration, lower volume materials) were to be sent off site for disposal, primarily at permitted facilities in Utah, Nevada, and Texas.

At the time the RI/FS activities were completed and the RODs put in place, an estimated 31 million pounds of uranium products, 2.5 billion pounds of waste, 255 buildings and structures, and 2.75 million cubic yards of contaminated soil and debris were identified as requiring action. In addition, a 223-acre portion of the Great Miami Aquifer was found to be contaminated at levels above radiological drinking water standards. Under the sitewide approach, the final remedial actions contained in the operable unit RODs were:

- Production and support facility D&D.
- On-site disposal of contaminated soil, above-and below-grade debris, and Operable Unit 2 waste unit materials, provided OSDF waste acceptance criteria (WAC) were met.

- Off-site disposal of the contents of the silos, the waste pit materials, nuclear product inventories, containerized low-level and mixed waste inventories, and the quantities of soil and debris that did not meet OSDF WAC.
- Extraction and treatment of contaminated groundwater to restore the contaminated portions of the Great Miami Aquifer to meet Safe Drinking Water Act requirements.

At completion, approximately 975 acres of the 1,050-acre property will be restored for use as an undeveloped park, the target land use selected in the OU 5 ROD, and approximately 75 acres will be dedicated to the footprint of the OSDF. The Great Miami Aquifer will be restored to drinking water standards, and long-term stewardship actions and requisite institutional controls will be put in place consistent with the target land use.

Taken together, the individual RODs for the operable units provided a sitewide cleanup approach that encompasses all contaminant source areas and all affected environmental media at the site. Collectively, the RODs provide a natural link between the remediation of the sources of contamination and the media affected. Each ROD progressively built on the decisions of the earlier RODs, yielding a cohesive and comprehensive remedy for the FCP. The ROD signature dates and progressive sequence of decisions adopted under the RODs are shown below:

- Operable Unit 3 ROD for Interim Remedial Action (July 22, 1994) – Provided accelerated approval for the D&D of the FCP's buildings and structures [DOE 1994a]
- Operable Unit 4 ROD for Final Remedial Action (December 7, 1994) – Provided for the remediation of Silos 1 through 4, affected soil within the operable unit boundary, and other sources of contamination within the boundary. The D&D of all remedial facilities constructed for the OU 4 remedial action are to be addressed as part of OU 3 [DOE 1994b]
- Operable Unit 1 ROD for Final Remedial Action (March 1, 1995) – Provided for the remediation of the waste pit contents, caps, and liners, affected soil within the operable unit boundary, and other sources of contamination within the boundary. The D&D of all remedial facilities constructed for the OU 1 remedial action are addressed as part of OU 3 [DOE 1995a]
- Operable Unit 2 ROD for Final Remedial Action (June 8, 1995) – Provided for the remediation of the Active and Inactive Flyash Piles, South Field disposal area, Lime Sludge Ponds, Solid Waste Landfill, affected soil within the operable unit boundary, and other sources of contamination within the boundary. This decision set in motion the approval of onsite disposal at the FCP and construction of the OSDF [DOE 1995b].
- Operable Unit 5 ROD for Final Remedial Action (January 31, 1996) – Provided for the remediation of the FCP's on-site and off-site environmental media. This ROD addressed the cleanup of the Great Miami Aquifer at all locations, and the remediation of affected site-wide soil and sediment outside the source operable unit boundaries. It also addressed the monitoring of air, surface water, groundwater, sediment, and biota. The OU 5 ROD finalized the concept of a site-wide OSDF, and further incorporated the "balanced approach" concept into FCP on-site and off-site waste disposition decisions. The D&D of all remedial facilities constructed to support the OU 5 groundwater remedial action were to be addressed as part of OU 3 [DOE 1996a].
- Operable Unit 3 ROD for Final Remedial Action (September 24, 1996) – Provided a final disposition decision for the D&D materials generated through the Interim Remedial Action ROD. Consistent with the OU 5 decision, the final decision document adopted on-site disposal as the selected remedy for disposition of the D&D debris. It also adopted earlier decisions as part of the "balanced approach" to send the FCP's containerized waste inventories

and nuclear materials off site. The ROD also acknowledged that the D&D of new remedial facilities constructed at the site would be addressed as part of OU 3 [DOE 1996b].

## 2.4 Removal Actions

Under CERCLA, a removal action (RA) is defined as a "short-term cleanup often completed prior to a more formal ROD process." Removal actions were initiated to accelerate cleanup activities to address releases or potential releases of hazardous substances. Table 2-1 summarizes the removal actions undertaken at the FCP. All of the RAs are complete. The term closed was defined by U.S. DOE, and refers to the date a final Removal Action Report was approved by U.S. EPA. The reports documented that all activities in the RA were completed. U.S. EPA also visually inspected the areas to confirm that the RA was complete.

**Table 2-1 – Removal Action Completion Status**

| RA No. | RA Name | Scope | Status |
|---|---|---|---|
| 1 | Contaminated Water Under FMPC Buildings | Pump water from extraction wells underneath Plants 2/3, 6, 8, and 9. Treat extracted water for volatile organic chemicals and uranium removal before discharge | Closed 9/13/95 |
| 2 | Waste Pit Area Runoff Control | Collect and treat contaminated storm water run-off from the waste pit area | Closed 7/2/92 |
| 3 | South Groundwater Contamination Plume | Collect and treat contaminated storm water from waste pit area, Install new alternate water supply, pump an discharge groundwater from South Plume, Install and operate interim Advanced Waste Water Treatment System, Conduct groundwater monitoring and institutional controls, conduct groundwater modeling and geochemical investigation | Closed, transferred to post-ROD 5/22/97 |
| 4 | Silo 1 and 2 Radon Control | Install bentonite cap to reduce and monitor radon emissions, provide follow-on monitoring | Closed 5/17/94 |
| 5 | K-65 Decant Sump Liquid Removal | Periodically remove liquid from K-65 decant sump tank | Closed 3/5/93 |
| 6 | Exposed Materials at Waste Pit 6 | Eliminate potential airborne contamination by resubmerging exposed pit material | Closed 3/25/92 |
| 7 | Plant 1 Waste Storage Pad Continuous Release | Implement run-on/off control, install new pad, and upgrade existing Plant 1 Storage Pad | Closed 2/16/95 |
| 8 | Inactive Flyash Pile | Install plastic chain link barrier and | Closed 12/23/91 |

**Table 2-1 – Removal Action Completion Status**

| RA No. | RA Name | Scope | Status |
|---|---|---|---|
| | Controls | post warning signs | |
| 9 | Removal of Waste Inventories | Disposition of low-level waste off-site | Closed. Transferred to post-ROD 5/22/97 |
| 10 | Active Flyash Pile Controls | Complete interim surface stabilization and complete active Flyash pile controls | Closed 5/16/97 |
| 11 | Waste Pit 5 Experimental Treatment Facility | Remove contents, structure, and filter material. Backfill and cap with clay cover | Closed 4/22/92 |
| 12 | Safe Shut Down of Production Facilities | Remove uranium and other material from former processing equipment and ship material and equipment off-site | Closed, transferred to post-ROD 5/22/97 |
| 13 | Plant 1 Ore Silos | Dismantle fourteen ore silos and their support structures | Closed 11/6/95 |
| 14 | Contaminated Soils Adjacent to Sewage Treatment Plant Incinerator | Isolate or remove and dispose of contaminated soils from the vicinity of the sewage treatment plant | Closed 1/3/95 |
| 15 | Scrap Metal Pile | Disposition If LLW Ferrous/non-ferrous scrap metal, Containerize and dispose of scrap copper | Closed 11/14/94 |
| 16 | Collect Uncontrolled Production Area Run Off | Collect storm water run-off from the northeast perimeter of the former production area in the Storm Water Retention Basin | Closed 5/22/97 |
| 17 | Improved Storage of Soil and Debris | Improve storage of existing and future generated soils and debris | Closed, transferred to post-ROD 5/22/97 |
| 18 | Control Exposed Materials in Waste Pit 5 | Eliminate potential airborne contamination by re-submerging exposed pit material | Closed 5/13/93 |
| 19 | Plant 7 D&D | Dismantle and dispose of the Plant 7 structure | Closed 8/18/95 |
| 20 | Stabilization of Uranyl Nitrate Solutions | Neutralize, filter and package UNH inventory | Closed 1/16/97 |
| 21 | Silo 3 Dust Collector Expedited Removal Action | Mitigate the potential release of hazardous waste material by covering and sealing dust collector hopper, removing dust collector, and capping and covering obvious release pathways | Closed 2/24/93 |

**Table 2-1 – Removal Action Completion Status**

| RA No. | RA Name | Scope | Status |
|---|---|---|---|
| 22 | Waste Pit Area Containment Improvement | Stabilize south barrier of Pit 4; regarding drainage ditches along Pits 3, 4, 5, and 6: and resurface road between Pits 3, 4, 5, and 6 | Closed 8/1/93 |
| 23 | Inactive Flyash Pile | Conduct field investigation to identify locations requiring material removal | Closed 6/29/92 |
| 24 | Pilot Plant Sump | Remove liquid and sludge from the sump | Closed 1/14/94 |
| 25 | Nitric Acid Tank Car | Remove residual contents from tank car and decontaminate and dispose of tank car | Closed 11/12/93 |
| 26 | Asbestos Removal | Mitigate the potential for contaminant and migration of asbestos fibers | Closed, transferred to post-ROD 5/22/97 |
| 27 | Management of Contaminated Structures (superceded by the Operable Unit 3 Interim ROD) | Management of contaminated structures | Closed, transferred to post-ROD 5/22/97 |
| 28 | Fire Training Facility | Remove, decontaminate, dispose, treat or store contaminated structures, equipment, and soil from the former Fire Training Facility | Closed 7/11/95 |
| 29 | Erosion Control and the Inactive Flyash Pile | Mitigate the threat of erosion induced slope failure and discharge of flyash to Paddy's Run | Closed 3/2/94 |
| 30 | KC2 Warehouse Well 67 | Well abandonment and plugging | Closed 5/28/97 |
| 31 | South Field & Inactive Flyash Pile Seepage Control | Minimize future groundwater contamination by intercepting contaminated seeps that drain from the South Field and Inactive Flyash Pile and infiltrate to the GMA | Closed 12/6/95 |

## 2.5 Remedial Actions

The following provides a brief description of the remedial actions undertaken under each of the five record of decisions. Interim and Final Remedial Action Reports, as appropriate, have been completed for each operable unit in accordance with EPA OSWER Directive No. 9320.2-09A-P, Closeout Procedures for National Priorities List Sites (January 2000).

### 2.5.1 Operable Unit 1 Remedial Actions

The OU 1 remedy as identified in the OU 1 ROD was: removal, treatment, and off-site disposal of the waste pit material at a permitted commercial disposal facility. Remedial actions were

initiated in April 1996. The following components describe the approach used towards remediation of OU 1.

- Construction of waste processing and loading facilities and equipment.
- Removal of water from open waste pits for treatment at the site's wastewater treatment facility.
- Removal of waste pit contents, caps and liners, and excavation of surrounding contaminated soil
- Preparation (e.g., sorting, crushing, shredding) of waste.
- Treatment of the waste by thermal drying as required to meet Envirocare WAC (the selected off-site disposal facility located in Clive, Utah; recently purchased by Energy Solutions).
- Waste sampling and analysis prior to shipment to ensure that the off-site disposal facility WAC are met.
- Off-site shipment of waste for disposal at Envirocare.
- Decommissioning and removal of the drying treatment unit and associated facilities, as well as miscellaneous structures and facilities within the operable unit.
- Disposition of remaining OU 1 residual contaminated soils in the on-site disposal facility, consistent with the selected remedy for contaminated process area soils as documented in the OU 5 ROD.

The Final Remedial Action Report for OU 1, which was approved by U.S. EPA on August 30, 2006, [DOE 2006a] provides a complete history of the remedial action undertaken.

### 2.5.2 Operable Unit 2 Remedial Actions

As identified in the OU 2 ROD, key components of the selected remedy for OU 2 are listed below. Remedial actions were initiated in June 1997.

- Construction of the engineered On-Site Disposal Facility (OSDF).
- Excavation of the OU 2 subunits to the required depth established by the OU 2 RI and FS Reports to remove materials with contaminant concentrations above the cleanup levels.
- Verification sampling and testing in the excavated area to confirm that material with contaminant concentrations above the cleanup levels have been removed.
- Segregation of debris (e.g., concrete, steel, pallets, etc.) from OU 2 subunits and processing for size reduction, as necessary, before disposal in the OSDF.
- Collection and treatment of water from the OU 2 subunits and OSDF construction areas.
- Transportation and on-site disposal of excavated material with a concentration at or below 346 pCi/g of U-238 or 1,030 ppm of total uranium.
- Transportation and off-site disposal of approximately 3,100 cubic yards of excavated material with concentrations above 346 pCi/g U-238 or 1,030 ppm total uranium.
- Excavation, treatment, and off-site disposal of approximately 300 cubic yards of lead-containing soil from the South Field Firing Range (handled as mixed waste).
- Restoration (including grading, seeding, fencing, and installation of monitoring wells) of Operable Unit 2 subunits after excavation and verification sampling and testing.
- Implementation of institutional controls such as access restrictions (fencing) and groundwater monitoring at the OU 2 subunits and OSDF.

- Maintenance of OU 2 subunits after restoration and maintenance and monitoring of the OSDF for at least 30 years following closure of the OSDF.

The Operable Unit 2 ROD preceded the ROD decisions for OU 5 and OU 3 by nearly a year. As a result, the costs, waste volumes, size, and configuration of the OSDF represented in the OU 2 ROD are specific to OU 2 materials only, since the on-site disposal decisions for OUs 5 and 3 had not yet been formally made. Ultimately, however, once the OU 5 and 3 on-site disposal decisions were finalized, the OSDF was sized and designed to accommodate all OUs resulting in a greater economy of scale and a combined sitewide design, siting, and implementation approach.

The Final Remedial Action Report for Operable Unit 2, which was approved by U.S. EPA on September 27, 2006,[DOE 2006b] provides a complete history of the remedial actions undertaken.

### 2.5.3 Operable Unit 3 Remedial Actions

At the time that uranium production operations ceased at Fernald, the former production buildings were at or beyond their design lives, and no viable future mission existed for the aging buildings and structures. As a result, DOE and EPA officially decided all of Fernald's buildings and structures would be dismantled, and the resulting dismantlement debris would be placed in interim storage. The initial dismantlement and interim storage decision was formally documented in the July 1994 OU 3 ROD for Interim Action (IROD). The IROD also provided that a subsequent final remedial action ROD would establish the final disposition strategy and locations for the materials generated by the interim remedial action. The first-step remedial activities approved through the IROD are listed below. Remedial action was initiated in August 1995.

- Surface decontamination of the buildings and structures by removing/fixing loose contamination
- Dismantlement of the above-grade buildings and structures
- Removal of foundations, storage pads, ponds, basins, and underground utilities and other at- and below-grade structures
- Off-site disposal, of up to ten percent by volume, of the non-recoverable waste and debris generated from structural D&D, until issuance of the final remedial action ROD
- Interim storage of the remaining waste and debris until a final disposition decision is identified in the final remedial action ROD.

The final remedial action ROD signed and approved by U.S. EPA on September 24, 1996, adopted the remedy of selected material treatment, on-property disposal, and off-site disposition, as the selected remedy for final dispositioning of the OU 3 materials. The key components of the selected remedy for final remedial action are:

- Adoption of Previous OU 3 Decisions
- Incorporates the facility and structural D&D decisions contained in the IROD so as to provide for an integrated implementation of the interim and final decisions
- Adopts the procedures and off-site disposition decisions (primarily Removal Actions 9 and 12) to continue the off-site disposition of the containerized wastes, products, residues, and nuclear materials generated during historical site operations
- Adopts the prior procedures and decisions for the management of Safe Shutdown (Removal Action 12), management of asbestos abatement (Removal Action 26), and management of debris (Removal Action 17)

- Approved Alternatives to Disposal – permitting the restricted/unrestricted release of materials, as economically feasible, for recycling or reuse
- Treatment of OU 3 Materials – permitting the treatment of materials to meet the OSDF WAC and/or off-site disposal facility WAC
- Off-Site Disposal of Materials Above the OSDF WAC
    - Requires the off-site disposal of process residues, product materials, and process-related metals generated during D&D activities
    - Requires off-site disposition of acid-resistant brick, lead sheeting, concrete from four designated locations to further minimize the total quantities of Tc-99 contaminated materials placed in the OSDF (top inch of concrete from two areas in Plant 9; an area in Plant 8; and an area in the Pilot Plant), and any other materials exceeding the OSDF physical and numerical WAC
- On-Property Disposal – Materials Eligible for Placement in the OSDF
    - Deems the remaining quantities of OU 3 D&D materials eligible for disposal in the OSDF; requires that the materials pass visual inspections for the presence of process residues during implementation
    - Recognizes the need for institutional controls at the completion of the remedy (consistent with OU 5)
    - Recognizes the need for long-term monitoring and maintenance of the OSDF and operation of a groundwater-monitoring network to evaluate performance of the OSDF consistent with OU 5. (Note: The scope for the long-term monitoring and maintenance of the OSDF, and the implementation of the site's institutional controls, are part of the FCP's post-closure long-term stewardship program and are not part of OU 3.)

The Final Remedial Action Report for OU 3, was submitted to U.S. EPA on December 12, 2006 [DOE 2006c].

### 2.5.4 Operable Unit 4 Remedial Actions

The final remedy implemented for OU 4 defined by the OU 4 ROD and its subsequent modifications consisted of:

- Removal of the contents of Silos 1 and 2 and the Decant Sump Tank System sludge from the Silos and transfer to the Transfer Tank Area (TTA) for storage pending subsequent transfer to the Silos 1 and 2 Remediation Facility for treatment using chemical stabilization to attain the disposal facility WAC;
- Removal of material from Silo 3 by pneumatic and/or mechanical processes, followed by treatment to the extent practical by addition of a chemical stabilization reagent and a reagent to reduce dispersability; and off-site disposal at NTS or a permitted commercial disposal facility
- Off-site shipment and disposal of the treated Silo 1 and 2 materials at the NTS and/or an appropriately permitted commercial disposal facility; or, temporary offsite storage for a maximum of two years from the initiation of storage activities, if required, prior to permanent offsite disposal;
- Gross decontamination, demolition, size reduction, and packaging of the Silos 1, 2, and 3 structures and remediation facilities in accordance with the OU 3 ROD;
- Shipment of the concrete from the Silos 1 and 2 structures for off-site disposal at the NTS or an appropriately permitted commercial disposal facility;

- Disposal of contaminated soil and debris, excluding concrete from Silos 1 and 2 structures, in accordance with the FCP OSDF WAC or an appropriate off-site disposal facility, such as the NTS or a permitted commercial disposal facility;
- Removal of the earthen berms and excavation of the contaminated soils within the OU 4 boundary to achieve the soil remediation levels outlined in the OU 5 ROD;
- Appropriate treatment and disposal of all secondary wastes at either the NTS or an appropriately permitted commercial disposal facility;
- Collection of perched water encountered during remedial activities for treatment in onsite treatment facilities installed under OU 5

Silo 3 materials have been disposed at Energy Solution in Clive, Utah. Silo 1 & 2 material is currently in temporary storage at Waste Control Specialists in Andrews, Texas. The Final Remedial Action Report for Operable Unit 4, which was approved by U.S. EPA on September 27, 2006, [DOE 2006d] provides a complete history of the remedial actions undertaken.

### 2.5.5 Operable Unit 5 Remedial Actions

The remedial strategy adopted for OU 5 was necessarily a multi-faceted approach to protect existing and future human and environmental receptors through implementing extensive soils excavations, excavating contaminated sediments and perched water zones containing concentrations above established final remediation levels, on-property disposal of excavated material in the OSDF (in compliance with established OSDF WAC), and restoration of the Great Miami Aquifer through pump and treat technologies. In addition, the remedy required treatment of collected storm water and process wastewater throughout remedial activities.

Key components of the OU 5 remedy related to groundwater restoration included the following:

Perched Water

- Excavation of perched water zones necessary to ensure the continued protection of the regional groundwater aquifer.
- Disposition of the soils generated during the removal of the impacted perched water zones in a manner consistent with the methods defined for soils.
- Treatment, as required, of contaminated perched water and storm water collected during excavation operations. The treatment envisioned was via the Advanced Wastewater Treatment facility and for zones contaminated by volatile organic compounds, the water was to be treated through activated carbon absorption.

Great Miami Aquifer Restoration

- Extraction of contaminated groundwater until such time as FRLs are attained at all points in the impacted areas of the Great Miami Aquifer. The basis of the groundwater FRLs and associated selection process was to utilize the SDWA established MCLs, proposed MCLs, or nonzero Maximum Contaminant Level Goals (MCLG). When these standards were not available for a specific contaminant other criteria were used to establish the necessary final remediation level. ($1 \times 10^{-5}$ Incremental Lifetime Cancer Risk (ILCR) for carcinogens; 0.2 Hazard Quotient (HQ) for noncarcinogens).
- Performance of an engineering study to examine the viability of applying re-injection techniques to enhance containment recovery from the aquifer system and application of re-injection to groundwater restoration activities where established to be economically and technically viable.

- Collection of recovered groundwater for treatment and/or discharge to the Great Miami River or re-injection (if deemed appropriate).

Treatment of Discharges

- Treatment of collected storm water, wastewater, and recovered groundwater before discharge to the Great Miami River to the extent necessary so as not to exceed FRLs for surface water in the Great Miami River.
- Treatment of the necessary wastewater, storm water, and groundwater to ensure that the maximum annual mass discharge of uranium to the Great Miami River from the effluent does not exceed 600 pounds. The 600-pound per year limit was effective upon issuance of the OU 5 ROD in January 1996. Further the uranium entering the Great Miami River is in a dissolved state. Previous to the ROD uranium discharges exceed the 600 pound limit. Surface water and sediment sampling was conducted at several locations throughout the river and results showed background or slightly above background concentrations of uranium. This is significantly less than the Great Miami River sediment Final Remediation level of 210 ppm and the surface water final remediation level of 530 ppb established in the OU 5 ROD.
- Overall, there are no significant impacts to the river. Under long-term average river flow conditions Fernald's outfall represents about 0.4 percent of the flow of the river, raising the concentration a fraction of a part per billion (0.12 ppb) after mixing, making the site contribution indistinguishable from natural background.
- Treatment of the necessary wastewater, storm water, and groundwater to ensure that the maximum concentration of total uranium in the blended effluent discharged to the Great Miami River does not exceed 20 $\mu$g/L (later revised to 30 $\mu$g/L per the OU 5 Explanation of Significant Differences) based upon a monthly average concentration. The concentration limit became effective January 1, 1998.
- Expansion of the Advanced Wastewater Treatment Facility (AWWT) within the confines of the existing Building 51 to provide a minimum additional design capacity of 1,800 gallons per minute (gpm).
- Disposal of treatment sludges generated from the treatment of wastewater, storm water, and groundwater in the OSDF if established waste acceptance criteria can be attained; otherwise disposal of the sludges at an appropriate off-site disposal facility.

Key components of the selected remedy for site-wide soil and sediment included:

- Excavation, using conventional construction equipment, of contaminated soil and sediment to the extent necessary to establish statistically, with reasonable certainty that the concentrations of contaminants at the entire site are below FRLs.
- Excavation, using conventional construction equipment, of contaminated soil containing perched water that presents an unacceptable threat, through contaminant migration, to the underlying aquifer.
- Placement of contaminated soil and sediment, which attain concentration-based WAC, in an on-property disposal facility. Soil exhibiting non-radiological contaminant concentrations exceeding the WAC (e.g., soil contaminated with organic constituents) will be treated before placement in the on-property disposal facility or shipped off site for disposal at an appropriate commercial or federal disposal facility. Soil exhibiting radiological contaminant concentrations exceeding the WAC will be shipped off-site for disposal. Soil from six designated areas where a reasonable potential exists for the presence of characteristic waste (as defined by RCRA) will be treated, as needed, before disposition.

- Site-wide restoration of impacted areas following excavation and certification sampling. Restoration will include regrading to blend with the surrounding topography and to promote positive drainage, seeding, fencing, and reestablishment of wetlands, as required.
- Application of institutional controls, such as access controls, deed restrictions, and alternate water supplies, during and after remedial activities to minimize the potential for human exposure to site-introduced contaminants and ensure the continued protection of human health. (Note: The deed to the site property has not been amended to show restrictions. U.S. DOE will maintain ownership in perpetuity. If the property is transferred a deed restriction will be entered.)
- Implementation of a long-term environmental monitoring program and a maintenance program to ensure the continued protectiveness of the remedy, including the integrity of the on-property disposal facility.

As identified in the OU 2 ROD, OU 5 ROD, and the OU 3 ROD for Final Remedial Action, key components of the on-site disposal selected remedy included:

- Construction of the engineered OSDF
- Establishment of maximum WAC for the OSDF
- On-site disposal of materials from OU 2, 3, and 5 that meet the OSDF WAC (including RCRA regulated materials using the Corrective Action Management Unit mechanism)
- Selected on-site disposal of soils from OUs 1 and 4
- Implementation of institutional controls such as access restrictions (fencing) and groundwater monitoring at the OSDF, for at least 30 years following closure
- Maintenance of the OSDF, including the final cover system and leachate collection system. Because this remedy results in contaminants remaining on site in an engineered disposal facility, a review will be conducted no less often than every five years after the initiation of remedial action in accordance with CERCLA §121(c) to ensure that the remedy continues to provide adequate protection of human health and the environment. This review will continue until determined that it is no longer needed to maintain protectiveness of the disposal facility.

In order to construct the OSDF over a sole-source aquifer capable of sustaining a yield of 100 gallons per minute, an OhioEPA exemption or an EPA CERCLA waiver was needed from the State of Ohio siting prohibitions. It was determined that a CERCLA waiver was the appropriate regulatory strategy. The waiver request was based on the ability of the selected remedial action to attain a standard of performance that is equivalent to that required by the ARARs. The criteria in determining a CERLCA ARAR waiver based on equivalent standard of performance were degree of protection, level of performance, reliability into the future, and time required to achieve remedial action objectives (40 CFR 300.430 (f)(1)(ii)(C)(4)). CERCLA waivers were requested, justified, and granted through the approval of the Operable Unit 2, Operable Unit 3, and Operable Unit 5 RODs. Therefore, U.S. EPA granted three CERCLA waivers to allow construction of the OSDF at the FCP and on-site disposition of materials from OUs 2, 3, and 5 (and selected materials from OUs 1 and 4).

In general, application of the WAC allowed materials from each of the OUs to be disposed in the OSDF as follows:

<u>Operable Unit 1</u>

- Waste Pit 4 cover material
- Impacted soils below or outside the waste pits that otherwise meet the OSDF WAC

Operable Unit 2

- Waste materials meeting the OSDF WAC from the North and South Lime Sludge Ponds, the Solid Waste Landfill, the Inactive Fly Ash Pile, the Active Fly Ash Pile, and the South Field area

Operable Unit 3

- D&D debris meeting the OSDF WAC and not otherwise prohibited

Operable Unit 4

- Impacted soils and debris not containing silos materials that otherwise meet the OSDF WAC
- D&D debris from Silo 4

Operable Unit 5

- Site-wide impacted soils, sediments, and debris meeting the OSDF WAC and not otherwise prohibited

Recognizing the on-going implementation of the groundwater remedy and the required long-term monitoring of the OSDF required by the OU2 ROD, an Interim Remedial Action Report for OU 5 will be submitted in January 2007 to U.S. EPA [DOE 2006e].

## 2.6 Institutional Controls

Institutional Controls are required under the CERCLA remediation process when a physical remedy does not allow for full, unrestricted use or when hazardous materials are left on site. The need for institutional controls is described in the OU 2 and OU 5 RODs. The selected remedy in the OU 5 ROD provided that a component of the selected remedy to be used to ensure protectiveness is institutional controls, including continued access controls at the site during the remediation period, alternate water supplies to affected residential and industrial wells, continued federal ownership of the OSDF and necessary buffer zones, and deed restrictions to preclude residential and agricultural uses of the remaining regions of the FCP property.

A Comprehensive Legacy Management and Institutional Controls Plan (LMICP), which was approved by U.S. EPA on August 7, 2006, [DOE 2006f] was developed to document the planning process and the requirements for the long-term care, or legacy management, of the Fernald site. Volume II of the LMICP is the Institutional Controls Plan required by the OU 2 and 5 RODs. Volume II provides the institutional controls that will ensure the cleanup remedies implemented at the Fernald site will protect public health and the environment. U.S. DOE will implement, maintain and enforce the institutional controls. The format and content of Volume II follows U.S. EPA requirements for institutional controls. Volume II is a legally enforceable CERCLA document. Volume II follows the requirements to the extent possible of U.S. EPA's September 2000 guidance "Institutional Controls: A Site Manager's Guide to Identifying Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups." Institutional controls as required by the RODs and specified in the LMICP were in place and functioning on October 29, 2006. Annual updates and/or recommendations for changes to institutional controls and the LMICP will be submitted annually in June to U.S. EPA and the Ohio EPA for review and approval.

The Institutional Controls Plan has five attachments that lend support and provide details regarding the established institutional controls. The attachments provide further detail on the continuing groundwater remediation (pump and treat) system (Attachment A); the OSDF cap and

cover system (Attachment B); the leak detection and leachate management systems for the OSDF (Attachment C); and the environmental monitoring that will continue following closure (Attachment D). All of these attachments were used during remediation, and all of them will be adhered to post-closure. Also attached to Volume II is the Community Involvement Plan (CIP) (Attachment E), a CERCLA required document, developed by U.S. DOE. The CIP explains in detail how the public will continue to participate in the future of the Fernald site.

### 2.7 Future Land Use

U.S. DOE is going to maintain future ownership of the property indefinitely. Portions of the Fernald site are restricted from public use. Restrictions relate to the groundwater extraction and treatment facilities present for the continued groundwater remedy and restrictions for access to the OSDF. The balance of the Fernald Site serves as an undeveloped park which will be primarily used for wildlife viewing and wetlands development. A Multi-Use Educational Facility (MUEF) is also being constructed which will be open to the public in late 2007. U.S. DOE will use the MUEF for continued communication with the public regarding the continuing groundwater remediation, legacy management activities, and the future of the Fernald site. Emphasis will be placed on education of the public regarding the site's former production activities, the site's remediation and land use restrictions. Education will include displays and programs at the MUEF and outreach programs to local schools and organizations. The MUEF will also serve as an institutional control as it will remind the community of past site activities and existing land use restrictions and risks. No commercial development is envisioned for the Fernald site.

## 3.0 Demonstration of Quality Assurance/Quality Control

The U.S. EPA and its contractor Tetra Tech EMI in consultation with the OhioEPA provided oversight of U.S. DOE and its contractor Flour Fernald's construction activities and found them to be consistent with the RODs as well as RD plans, specifications and drawings.

The FCP remediation facilities were designed, constructed, inspected, tested, operated, and controlled under Fluor Fernald's Quality Assurance Program Requirements Manual, RM-0012. The standards for quality reflected in RM-0012 were derived from U.S. DOE Regulations at 10 CFR Part 830 Subpart A, Quality Assurance Requirements. Fluor Fernald's Quality Assurance Program also incorporates appropriate requirements from U.S. DOE's Quality Assurance Management System Guide for use with 10 CFR 830.120 (G 414.1-2). This program specified standards by which systems were designed, procured, installed, tested and operated. Further, construction quality assurance plans incorporated U.S. EPA and Ohio EPA requirements.

Environmental data used to support the design and operation of remediation facilities, environmental monitoring, groundwater remedy performance, OSDF WAC attainment, and soil certification were collected in accordance with the Site-Wide CERCLA Quality Assurance Project Plan (SCQ), which was approved by U.S. EPA on February 10, 2004 [DOE 2003]. The SCQ was developed for FCP environmental sampling and analysis, consistent with U.S. EPA and OhioEPA procedures and guidance, with a two-fold purpose: (1) establish minimum standards of performance for operational and analytical activities, and (2) ensure that parties covered by the plan follow those standards. The SCQ integrates CERCLA requirements into applicable sampling activities at the FCP.

Continued management and operations of the site are governed by the Legacy Management Contractor, Stoller Legacy Management Team, Quality Assurance Manual (Manual STO 1).

## 4.0 Activities and Schedule for Site Completion

Final Site completion is defined as the point at which all response actions have been completed. The criteria to be met include:

- All cleanup goals specified in all site RODs have been achieved
- All RODs, ROD Amendments, Explanation of Significant Differences have been completed
- The site is protective of human health and the environment; and
- The only remaining activities at the site are those operation and maintenance activities that are performed by the responsible parties.

For the FCP, final site completion will be achieved at the time that the groundwater has been certified to meet the Final Remediation Levels (FRLs) stipulated in the OU 5 ROD. Once this has been achieved, the D&D of any remaining structures related to the groundwater infrastructure will be completed and final certification of FRL attainment of any remaining contaminated soils (those soils within the foot print of these remaining structures), sediment, and surface water will be performed. Once all these FRLs have been achieved, U.S.DOE will perform a Final Residual Risk Assessment to formally demonstrate that the remedies in their entirety are protective of human health and the environment. Once these activities have been satisfactorily completed, a Final Remedial Action Report for OU 5 will be prepared and submitted to U.S. EPA for approval. Also the Final Closeout Report (FCOR) will be developed, which may be used to initiate the formal deletion process from the NPL.

### 4.1 Schedule for Attaining Site Completion

As discussed above, the critical activity that must first be met to attain site completion is the completion of the groundwater remedy. A Groundwater Certification Plan, which was approved by U.S. EPA on June 2, 2006,[DOE 2006g] defines the programmatic strategy for certifying the completion of the groundwater remedy. Time estimates for completion of the aquifer remedy are complicated by the unknown aquifer responses to the pump and treat remediation such as contaminant concentration tailing (progressively slower rate of dissolved contaminant concentration decline) and contaminant concentration rebounding.

Each of the three main groundwater modules (South Plume, South Field, and Waste Storage Modules) will go through five distinct phases followed by a long term monitoring period to document that groundwater FRL exceedances do not occur following completion of a module certification process. The five stages of groundwater certification include:

- Stage I - Pump and Treat. This stage will continue until groundwater FRL constituent concentrations have been achieved
- Stage II – Hydraulic Equilibrium State. This stage will document that steady-state water level conditions have been achieved following termination of the pump and treat operation
- Stage III – Certification/Attainment Monitoring. This stage include quarterly monitoring for a period of three years using existing monitoring wells and other methodologies as needed (e.g. direct push sampling) to document FRLs are maintained
- Stage IV - Declaration and Transition Monitoring. The preparation of a certification report will be prepared for the module being certified. Monitoring during this stage will be

conducted to ensure the clean module is not being re-contaminated by upgradient contamination

- Stage V – Demobilization. This stage involves removing infrastructure, well abandonment, and soil excavation/certification

Table 4-1 includes a tentative schedule for the activities necessary to achieve site completion.

**Table 4-1 – Site Completion Activity Schedule**

| Activity | Tentative Date |
|---|---|
| Update Legacy Management Institutional Control Plan and recommend any changes for U.S. EPA and Ohio EPA approval | Annually in June |
| Groundwater Treatment to Meet Discharge Limits Ends (CAWWT Operations End) | 2015 |
| South Plume Module Certified Clean | 2018 |
| South Field Module Pump and Treat Operations End | 2022 |
| Waste Storage Area Pump and Treat Operations End | 2023 |
| South Plume Module – Remove Infrastructure | 2025 |
| South Field Module Certified Clean | 2025 |
| South Field Module – Remove Infrastructure | 2026 |
| Waste Storage Area Module Certified Clean | 2026 |
| Waste Storage Area – Remove Infrastructure | 2026 |
| Soil Certification Complete | 2026 |
| Surface Water and Sediment Certification Complete | 2027 |
| Final Residual Risk Assessment Complete | 2028 |
| Final Remedial Action Report Issued | 2029 |
| Final Closeout Report Issued | 2030 |
| Long Term Monitoring Complete | 2031 |

## 4.2 Operation and Maintenance

The groundwater remedy is operational and functional. All necessary groundwater extraction systems are operational and the aquifer is responding in a manner consistent with predicted performance. Required treatment systems are on-line and functioning as designed. Operable Unit 5 discharge limits to the Great Miami River for uranium are being met as well as NPDES limits for non-radiological parameters.

- While the OSDF construction has been completed, the performance of each of the eight distinct disposal cells is as expected. An action leakage rate of 200 gallons per acre per day (gallons/acre/day) was established during the design of the OSDF. Moreover, U.S. DOE agreed to a significantly more conservative "initial action leakage rate" of 20 gallons/acre/day in the leak detection system. Accumulation rates in the leak detection system (LDS) are evaluated weekly for each of the eight disposal cells and the initial action leakage rate has never been exceeded. Leachate is collected and treated in batches at the CAWWT. After treatment the water is discharged to the Great Miami Aquifer at levels below 30 ppb total uranium. The site complies with NPDES limits and under long-term average river flow conditions Fernald's outfall represents about 0.4 percent of the flow of the river, raising the concentration a fraction of a part per billion (0.12 ppb) after mixing. The 30 ppb total uranium limit is the drinking water MCL and well below the Great Miami River surface water final remediation level of 530 ppb established in the OU 5 ROD.

The Institutional Control Plan (Volume II of the LMICP) includes four attachments that govern the continued operations and maintenance of the groundwater pumping and treatment infrastructure and the maintenance and monitoring of the OSDF. These documents are enforceable under the Institutional Controls Plan and assure continued successful operation of the groundwater remedy and performance of the OSDF.

- Attachment A, The Operations and Maintenance Master Plan for the Aquifer Restoration and Wastewater Project (OMMP). The OMMP establishes the design logic and priorities for the major flow and water treatment decisions needed to maintain compliance with the Fernald site's National Pollutant Discharge Elimination System (NPDES) permit and OU 5 ROD based surface water discharge limits. The OMMP is designed to guide and coordinate the extraction, collection, conveyance, treatment, and discharge of all groundwater, storm water, sanitary and remediation wastewater generated site-wide through the duration of the cleanup program.
- Attachment B, The Post-Closure Care and Inspection Plan; On-site Disposal Facility (PCCIP). The PCCIP addresses the inspection, monitoring, and maintenance activities necessary to ensure the continued proper performance of the OSDF. Key concepts addressed include ownership; access controls and restrictions; deed and/or use restrictions; environmental monitoring; OSDF cap and buffer area inspections; custodial maintenance; contingency repair; corrective actions; emergency notifications; reporting; and public involvement
- Attachment C, The Groundwater/Leak Detection and Leachate Monitoring Plan (GWLMP). The GWLMP specifies the frequencies and parameters being monitored in four horizons for each cell of the OSDF. These horizons are the leachate collection system (LCS), the leak detection system (LDS), perched water in the glacial overburden, and the Great Miami Aquifer (both upgradient and downgradient of each cell). Cell-specific data from these four horizons are evaluated holistically in order to verify the integrity of the cells.
- Attachment D, The Integrated Environmental Monitoring Plan (IEMP). The IEMP directs environmental monitoring program elements that support site remediation activities. The document outlines all regulatory requirements for site-wide monitoring, reporting, and remedy performance tracking activated by the applicable or relevant and appropriate requirements (ARARs) identified in the remedy selection documents. The environmental monitoring program encompasses groundwater, surface water and treated effluent, air monitoring, and sediment monitoring

### 4.3 Organization

The Office of Legacy Management (DOE-LM) was formally established as a new U.S. DOE element on December 15, 2003. This Office is responsible for ensuring that U.S. DOE's post-closure responsibilities are met, and for providing U.S. DOE programs for long-term surveillance and maintenance, records management, work force restructuring and benefits continuity, property management, land use planning and community assistance.

The U.S. DOE-LM contractor, S.M. Stoller, Inc., has developed an organization comprised primarily of personnel that have a past working relationship with the Fernald Site to ensure continuity of operations as well as retaining a knowledge of the history of the remediation at the FCP.

## 5.0 Summary of Remediation Costs

The costs presented below focus on those remedial costs specifically associated with the individual remedies conducted for the OU of interest. The costs presented do not include administrative or overhead costs for managing the site as a whole, such as for oversight, site administration and management, communications and reporting, site-wide utilities, office space, and other such landlord costs. Costs are presented for remedy implementation and completion and do not include costs associated with the remedial investigation and feasibility study. In addition, costs presented are based on the scope of work described in the individual Interim and Final Remedial Action Reports.

| | |
|---|---|
| Operable Unit 1 Total Cost: | $449 Million Dollars |
| Operable Unit 2 Total Cost: | $33.6 Million Dollars |
| Operable Unit 3 Total Cost: | $577.2 Million Dollars |
| Operable Unit 4 Total Cost: | $588.3 Million Dollars* |
| Operable Unit 5 | |
| OSDF Construction Total Cost: | $224.2 Million Dollars** |
| Soils and Sediment Total Cost: | $271.8 Million Dollars*** |
| Aquifer Restoration/Wastewater Treatment Total Cost: | $218.6 Million Dollars**** |
| **Total Cost** | **$2,362.7 Million Dollars** |

* Additional costs will be incurred to achieve the final disposal of Silo 1 & 2 materials currently in temporary storage.
** An additional estimated 1.4 Million Dollars will be expended through fiscal year 2012 for OSDF cap inspection and maintenance. Estimated costs for this effort beyond 2012 has not been made at this time.
*** Costs will be experienced to certify remaining soils beneath the groundwater infrastructure but no estimate has been made at this time.
**** Additional costs will be incurred to complete the groundwater remedy. It is estimated that $70.9 Million Dollars will be expended through 2012 to complete the necessary treatment operations. An additional estimated $250.6 Million Dollars will be expended from 2013 through groundwater certification in 2026. Costs will be experienced to remove the groundwater infrastructure but no estimate has been made at this time.

## 6.0 Five Year Reviews

The five-year review is statutorily required under CERCLA at National Priority List sites, such as the FCP, that implement remedial actions resulting in hazardous substances, pollutants, or contaminants remaining at the site above levels allowed for unlimited use and unrestricted exposure. U.S. DOE must conduct and document the five-year reviews for U.S. EPA concurrence, in accordance with CERCLA (Section 120 and 121) and Executive Order 12580.

To date, two such reports have been developed by U.S. DOE; April 2001 and April 2006. U.S. EPA concurred with U.S. DOE's protectiveness statements for the first five-year review on September 27, 2001, and the second five-year review on September 16, 2006 [DOE 2006h].

The results of the second five year review concluded that all five OU remedies are expected to be protective of human health and the environment and that all immediate threats have been addressed. The second five year review was written at a time prior to the completion of the remedial actions described in Section 2.5. The next five-year review report, due to

U.S. EPA on, or before, April 1, 2011, will present a similar review strategy, with the primary difference being all remedial actions, except groundwater restoration, will have been completed.

for Richard C. Karl, Director
Superfund Division

12/20/06
Date

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