EPA Region 5 Records Ctr.
263844

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

REPLY TO THE ATTENTION OF:

SR-6J

September 28, 2006

Mr. Arthur Kleinrath, Site Manager
Office of Legacy Management
Department of Energy
Miamisburg, OH 45343-0066

RE: US DOE Mound Plant, Miamisburg, Ohio
Five-Year Review Report

Dear Mr. Kleinrath,

The United States Environmental Protection Agency (US EPA) has reviewed the Five-Year Review Report dated September 2006, developed by the United States Department of Energy for the Mound site. US EPA concurs with the protectiveness statements and hereby approves the report.

Please feel free to contact, Timothy Fischer, of my staff, if you have any questions at (312) 886-5787.

Sincerely,

for Richard C. Karl, Director
Superfund Division

cc: Tim Thurlow, ORC
Tim Fischer, SFD
Brian Nickel, Ohio EPA

DOE-LM/1308-2006

Office of Legacy Management

Five-Year Review Report

Second Five-Year Review for the Mound, Ohio, Site Miamisburg, Ohio

September 2006

U.S. Department of Energy

Office of Legacy Management

Work Performed Under DOE Contract No. DE-AC01-02GJ79491
for the U.S. Department of Energy Office of Legacy Management.
Approved for public release; distribution is unlimited.

DOE-LM/1308–2006

Five-Year Review Report

Second Five-Year Review for the Mound, Ohio, Site Miamisburg, Ohio

September 2006

Work Performed by S.M. Stoller Corporation under DOE Contract No. DE–AC01–02GJ79491
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

Approved by: Date:

Art Kleinrath Sept 21 2006

Art Kleinrath
Site Manager

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Acronyms

ARAR	applicable or relevant and appropriate requirement
ATD	Authorization to Discharge
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminants of concern
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
ft	feet
FY	fiscal year
GPS	global positioning system
ICs	institutional controls
LTS&M	Long-Term Surveillance and Maintenance
MCL	maximum contaminant level
MESH	Miamisburg Environmental Safety and Health
mg/L	milligram(s) per liter
MMCIC	Miamisburg Mound Community Improvement Corporation
MNA	monitored natural attenuation
µg/L	microgram(s) per liter
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
ODH	Ohio Department of Health
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
P&T	pump and treat
PCE	perchloroethene
pCi/L	picocurie(s) per liter
PRG	preliminary remediation goal
PRS	potential release site
RAO	remedial action objective
ROD	Record of Decision
RRE	residual risk evaluation
RREM	Residual Risk Evaluation Methodology
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SVE	soil vapor extraction
TCE	trichloroethylene
VOC	volatile organic compounds

Executive Summary

The Mound Site in Miamisburg, Ohio, is being remediated by the U.S. Department of Energy (DOE) in accordance with the requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. This Five-Year Review includes several operable units and areas (parcels) that have been designated part of the remedial action at the Mound Site. These include:

- Operable Unit 1 (Former Waste Disposal Sites)
- Operable Unit 4 (Miami-Erie Canal)
- Release Block D
- Release Block H
- Phase I (Areas A, B, and C)
- Parcel 3 (GP-1 and GH)
- Parcel 4 (South Property)

The CERCLA Five-Year Review is required by statute. Section 121 (c) of CERCLA requires that remedial actions resulting in any hazardous substances, pollutants, or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure be reviewed every five years to ensure protection of human health and the environment.

This is the second Five-Year Review conducted for the Mound Site. Since the last Five-Year Review, completion of soil and building remediation at the Mound site was achieved in August 2006. Institutional controls (ICs) have been implemented for Parcels 3 and Phase I and a monitored natural attenuation (MNA) remedy has been implemented for trichloroethylene (TCE) contaminated groundwater in Phase I. Operation of the pump and treatment system, which controls the migration of TCE contaminated groundwater in the Operable Unit 1 (OU-1) area, continues to operate. The ownership of 5 land parcels has been transferred to the Miamisburg Mound Community Involvement Corporation (MMCIC). Phase I (Sections A, B, and C), and Parcels 6,7, and 8 have not transferred, but remedial activities have been completed. Additional soil removal work is expected in the OU-1 area to support economic redevelopment. The record of decision (ROD) for the Miami-Erie canal was "no action" and will not be further evaluated under this review.

The ICs implemented at the Mound site are protective of human health and the environment because they are functioning as intended. The groundwater remedy for Phase I is expected to be protective of human health and the environment upon attainment of cleanup goals. In the interim, exposure pathways are being controlled through ICs. The remedy for OU-1 is protective of human health and the environment as exposure pathways are being controlled through plume containment and control of access to the landfill. However, in order to ensure the long-term protectiveness of the remedies, it is recommended that a few actions be taken as best management practices at the site. These actions are:

- Adequate signage that informs visitors that fishing, as well as swimming and wading, is prohibited in the Parcel 4 retention basin should be installed.

- Long-term groundwater and seep monitoring locations should be adequately maintained to ensure that representative samples are obtained and to prevent possible impact to the aquifer via surface water infiltration.

This is the second statutory Five-Year Review for this site. The next Five-Year Review will be conducted in the year 2011.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name ***(from WasteLAN)*****: Mound Plant (DOE)**		
EPA ID ***(from WasteLAN)*****: OH6890008984**		
Region: 5	**State: OH**	**City/County: Miamisburg / Montgomery**
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs?* ☒ YES ☐ NO	**Construction completion date:** Not Applicable	
Has site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency -- U.S. Department of Energy		
Author name: Art Kleinrath		
Author title: Site Manager	**Author affiliation: DOE**	
Review period:** 09 / 29 / 2001 to 09 / 28 / 2006		
Date(s) of site inspection: 02 / 22 / 2006 and 07 / 13 / 2006		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#____ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date ***(from WasteLAN)*****:** 09 / 28 / 2001		
Due date ***(five years after triggering action date)*****:** 09 / 28 / 2006		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:
Issue 1: Ineffective signage at the Parcel 4 retention basin has resulted in violation of institutional controls (ICs) in the past (land-use inconsistent with industrial/commercial land-use). (Sections 6.5.4 and 6.5.5).
Issues 2,3,4, and 5: Permanent ID markers are not instated on all long-term groundwater monitoring wells. The general conditions of the long-term groundwater monitoring locations are in disrepair (i.e., protective casings, protection from vehicular traffic, excessive vegetation, etc.) (Section 6.5 and photographs in Appendix B).
Issue 6: Excessive vegetation is present around the OU-1 facility and structures and on the landfill surface. (Section 6.6.3 and photographs in Appendix B).
Issue 7: Inadequate stormwater control is maintained on the southwestern corner of the landfill. (Section 6.6.3 and photographs in Appendix B).
Issue 8: Inadequate documentation and interpretation of operational and monitoring data for the OU-1 remedy is maintained. (Section 6.4.1).

Recommendations and Follow-up Actions:
Issue 1. Signage that informs area visitors that fishing, as well as swimming and wading, is prohibited would be more straightforward or alternative signage should be developed.
Issues 2,3,4, and 5. A routine maintenance program needs to be established for the long-term groundwater monitoring locations at the Mound site.
Issue 6. A routine maintenance program to address vegetation and general housekeeping needs to be established for me OU-1 area.
Issue 7. A corrective action should be developed to address the inadequate stormwater controls on the southwestern comer of the OU-1 landfill.
Issue 8. An annual report summarizing the hydraulic gradient determinations, groundwater monitoring data, and performance evaluations of the OU-1 pump and treatment and soil vapor extraction (SVE) systems should be prepared.

Protectiveness Statement(s):
Operable Unit 1: The remedy for OU-1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled through containment of the plume and control of access to the landfill. However, in order to ensure the long-term protectiveness of the remedy, adequate documentation and interpretation of the operational and monitoring data associated with the pump and treatment system should be maintained. Also, long-term monitoring locations should be adequately maintained to ensure that representative samples are obtained and to prevent possible impact to the aquifer via surface water infiltration.

Phase I Groundwater (MNA) Remedy: The remedy for Phase I is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through MNA. In the interim exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent the groundwater from being used in the restricted area. However, in order to ensure the long-term protectiveness of the remedy, long-term monitoring locations should be adequately maintained to ensure that representative samples are obtained and to prevent possible impact to the aquifer via surface water infiltration.

Institutional Controls (Including Phase I): The remedy for Parcels D, H, 3, and 4 and institutional controls associated with Phase I are protective of human health and the environment because controls are functioning as intended. However, in order to ensure the long-term protectiveness of the remedy, adequate signage that informs visitors that fishing, as well as swimming and wading, is prohibited in the Parcel 4 retention basin should be instated.

Other Comments:
There are no other comments to make at this time.

1.0 Introduction

The U.S. Department of Energy (DOE) has conducted a second Five-Year Review of the remedial actions implemented at the Mound Site in Miamisburg, Ohio. This review was conducted from February 2006 through September 2006. This report documents the results of the review and has been prepared in accordance with the Comprehensive Five-year Review Guidance (EPA 2001).

The first Five-year review was completed in September 2001. This was the first review to ensure that the remedial action established in the Record of Decision for Operable Unit 1 (DOE 1995) remained protective of human health and the environment. The review was a statutory review and the purpose was to ensure the engineered or institutional measures being relied on to protect human health and the environment continued to function and operate as intended such that no unacceptable exposures to residual contamination remaining at the site occurred.

The first Five-Year Review also had a discussion regarding the Records of Decision (RODs) for the 3 land parcels that had transferred at that time. These parcels were Release Blocks D and H and Parcel 4. A protectiveness determination was not made at that time since the first assessment had not been completed at the time of the 2001 review.

This Five-Year Review encompasses several operable units and areas (parcels) that have been designated part of the remedial action at the Mound Site. These include:

- Operable Unit 1 (Former Waste Disposal Sites) - 1995
- Operable Unit 4 (Miami-Erie Canal) - 2004
- Release Block D - 1999
- Release Block H- 1999
- Phase I (Areas A, B, and C) - 2003
- Parcel 3 (GP-1 and GH) - 2001
- Parcel 4 (South Property) - 2001

Although the remedial actions for all of these areas except Operable Unit 1 (OU-1), Parcel 4, and Release Blocks D and H have not been implemented for five years, they are included in this Five-Year Review. The U.S. Environmental Protection Agency (EPA) guidance states that "Five-year reviews should address all operable units and remedial actions that have been initiated at the time of the review." Also the guidance states "A site is subject to a statutory review if any one of its initiated remedial actions is subject to a statutory review."

1.1 Purpose

The purpose of the Five-Year Review is to determine whether the remedy at a site is expected to be protective of human health and the environment. Where a site has remedial actions that are still ongoing, a Five-Year Review should confirm that immediate threats have been addressed and that the remedy will be protective when complete. The main purpose of the Five-Year Review is to evaluate the implementation and performance of the selected remedy, not to reconsider past remedy decisions. The methods, findings, and conclusions of reviews are

documented in Five-Year Review reports. In addition. Five-Year Review reports identify deficiencies found during the review, if any, and identify recommendations to address them.

Five-year reviews are required by statute. They must be implemented consistent with the Comprehensive Environmental Response. Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section I2l(c), as amended, states:

> "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than five years after the initiation of such remedial action to ensure that human health and the environment are being protected by the remedial action being implemented."

The NCP Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

1.2 Site Status

Completion of soil and building remediation at the Mound site was achieved in August 2006. At that time, the ownership of 5 land parcels had been transferred to Miamisburg Mound Community Improvement Corporation (MMCIC). Phase I (Sections A, B, and C), and Parcels 6, 7, and 8 (which includes OU-1), have not transferred, but remedial activities have been completed.

DOE through the Operations and Maintenance (O&M) Plans and the Long-Term Surveillance and Maintenance (LTS&M) Plan will maintain the necessary facilities and structures to implement the remedies. These include:

- The OU-1 Pump and Treat system, including 3 extraction wells, soil vapor extraction points, treatment plant, and discharge point will remain after completion of site activities. A groundwater monitoring system has been designated for monitoring in order to evaluate the capture of contaminated groundwater in this area.

- Sampling associated with the Phase I groundwater remedy is on going. Nine monitoring wells and I seep comprise the groundwater monitoring network for the Phase I area.

- Institutional controls (ICs) associated with parcels D, H, 3, and 4 and Phase I have been documented in the appropriate ROD and the quit claim deed for the parcel. Upon transfer, the quit claim deed is recorded with Montgomery County as a matter of public record. The Phase I parcel has not been transferred to MMCIC, although the remedial actions have been completed and a Record of Decision finalized.

Soil removal and building demolition in Parcels 6,7, and 8, which encompass the northern portion of the Mound Plant property, have been completed. A ROD is being developed to address the necessary ICs on the property. Also, tritium impact to the shallow aquifer will be addressed in that ROD. Transfer of this property is anticipated in fiscal year (FY) 2007.

DOE is planning further soil excavation and site development work in the OU-1 area. This work is being developed and it is anticipated that field work will start in FY 2007.

2.0 Site Chronology

Construction of the Mound facility began in 1946 and served to support the early atomic weapons programs. It later grew into an integrated research, development, and production facility performing work in support of DOE weapons and energy programs, with emphasis on explosives and nuclear technology.

The plant, which was in operation from 1948 to 1995, was situated on 182 acres. In 1981, DOE purchased an additional 124 acres of land south of the original property; however, the property remained undeveloped.

In 1984, the Environmental Restoration Program at the Mound Site was established to collect and assess environmental data in order to evaluate both the nature and extent of contamination and to identify potential exposure pathways and potential human and environmental receptors (i.e., develop a conceptual site model).

The Mound site was placed on the National Priorities List (NPL) in November 1989 because of chemical contamination present in the site groundwater and the site's proximity to a sole source aquifer.

A Federal Facilities Agreement (FFA) between DOE and EPA was signed in October 1990. In July 1993, the FFA became a triparpite agreement through the addition of the Ohio EPA (OEPA).

The OU-1 ROD was approved in 1995. The selected remedy of controlling contamination from the soils and groundwater at OU 1 is collection, treatment, and disposal of groundwater.

In 1995, DOE and its regulators developed an approach to making decisions about the environmental restoration of the Mound site and its facilities. This approach is known as the Mound 2000 process, which meets the requirements of CERCLA Section 120(h)- *Property Transfer of Federal Agencies.* DOE and its regulators used the Mound 2000 process to address the environmental issues associated with the restoration of the site, completion of work at the site, and deletion of the site from the NPL.

The Miami-Erie Canal underwent a soil clean-up, primarily for plutonium, in 1998. The canal, lying outside the Mound Property boundary, was included on the NPL due to impact from operational and accidental releases from the facility.

The sales contract between DOE and MMCIC that establishes how DOE will convey the entire Mound Site by discrete parcels, subject to the CERCLA §120 (h) - *Property Transfer of Federal Agency* was dated January 23, 1998.

The *Record of Decision for Release Block D* was approved in 1999. The selected remedy for release block D is ICs.

The *Record of Decision for Release Block H* was approved in 1999. The selected remedy for release block H is ICs.

The deed for Release Block H was filed with Montgomery County, Ohio on August 8,1999 and the deed for Release Block D was filed on November 19, 1999.

The *Parcel 4 Record of Decision* - (South Property) was approved in 2001. The selected remedy for Parcel 4 is ICs.

The EPA and OEPA determined that all appropriate CERCLA response actions have been completed for Release Blocks D and H and these areas pose no significant threat to human health or the environment. Therefore. EPA deleted Release Blocks D and H from the NPL on April 16, 2001.

The deed for Parcel 4 was Tiled with Montgomery County, Ohio on April 19,2001.

The *Parcel 3 Record of Decision* - (GP1 and GH) was approved in 2001. The selected remedy for Parcel 4 is ICs.

The deed for Parcel 3 was Filed with Montgomery County, Ohio on August 2,2002.

The EPA, with concurrence of the OEPA, determined that the DOE implemented all appropriate response actions required for Parcel 4, and that no further CERCLA response was appropriate to provide protection of human health and the environment. Therefore, EPA deleted Parcel 4 from the NPL on December 2, 2002.

The Phase I Record of Decision (Ref. 18) was approved in 2003. The selected remedy for trichloroethylene (TCE) contamination in Phase I is monitored natural attenuation with ICs.

A no-action Record of Decision for OU-4 (Ref. 12) regarding the soil/sediment in the Miami-Erie Canal was approved in 2004.

3.0 Background

3.1 Site Description

The Mound site is located in Miamisburg, Ohio, approximately 10 mi. southwest of Dayton (Figure 3-1). The original site was comprised of 17 buildings on 182 acres of land. In 1995, the DOE Mound Plant, named after the Miamisburg Indian Mound that is adjacent to the site, was comprised of 120 buildings on 306 acres. The Great Miami River located west of the site flows from northeast to southwest through Miamisburg and dominates the geography of the region surrounding the Mound site.

The Mound site sits atop an elevated area overlooking the city of Miamisburg, the Great Miami River, and the river plain area to the west. To the west of the plant is an abandoned section of the Miami-Erie Canal that parallels the river. An intermittent stream runs through the plant valley and drains to the river.

Site elevations vary from 700 ft to 900 ft above sea level; most of the site is above 800 ft. No building in which radioactive material was processed is located below an elevation of 790 ft. The typical non-flood stage of the Great Miami River is 682 ft. The highest floodwater levels that can be reasonably postulated for the Great Miami River basin (100-year storm event) would result in flooding to 700 ft. Parcels H and 4 of the Mound Site lie within the 100-year floodplain of the Great Miami River.

3.2 Land and Resource Use

The river valley is highly industrialized, while the rest of the region is a mix of farmland, residential area, small communities, and light industry. Many city and township residences, five schools, the Miamisburg downtown area, and six of the city's 17 parks are located within 1 mile of the Mound Site.

Population information extracted from the 2000 Census shows that within a 10-mi. radius of the Mound site, there are 340,000 residents, and within a 50-mi. radius of the site, there are 3,127,000 residents. The primary agricultural activity in the area is raising field crops such as corn and soybeans. Approximately 10 percent of the agricultural land is devoted to livestock.

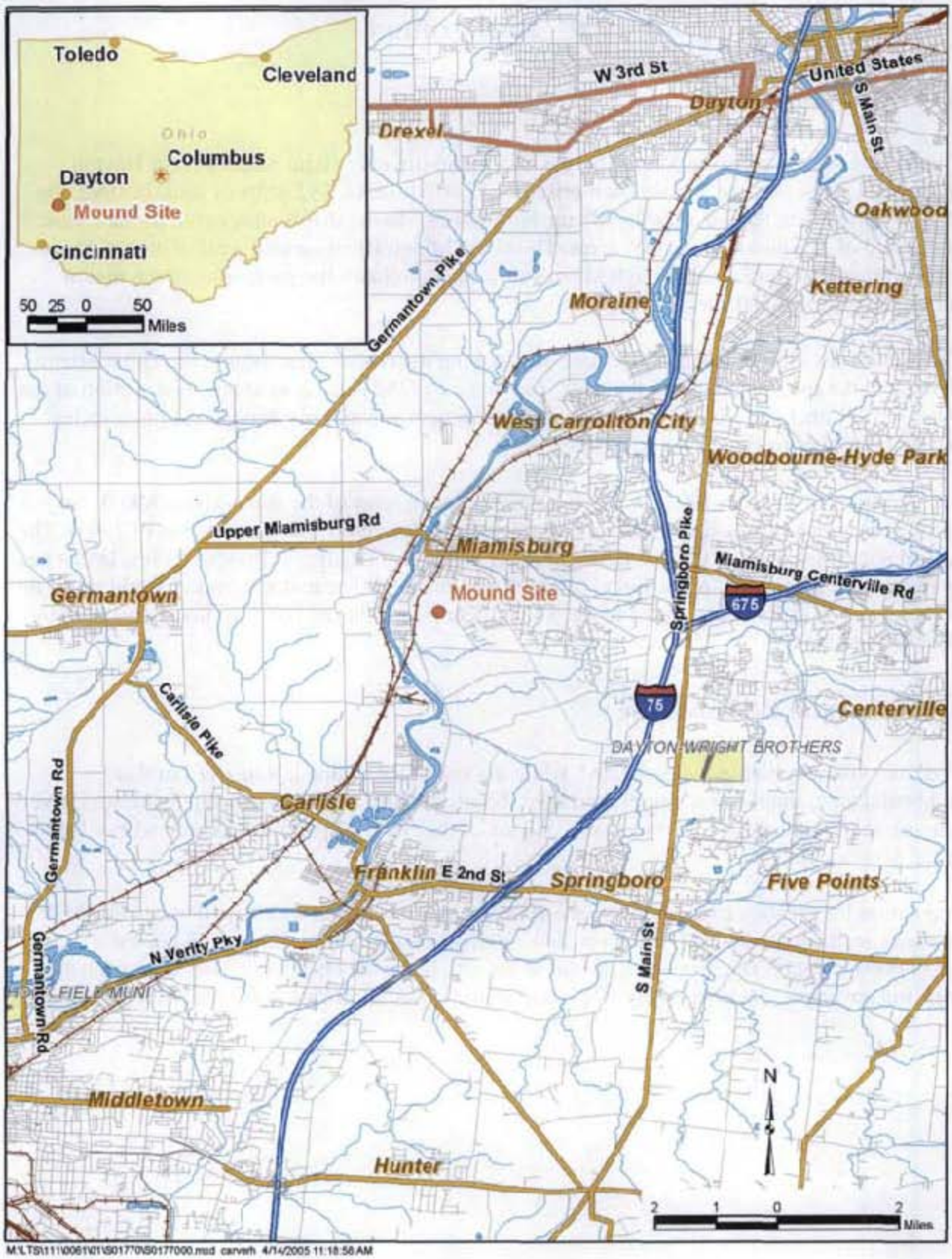


Figure 3–1. Mound, Ohio, Site Location Map

3.3 Site History and Enforcement Activities

3.3.1 History

The Mound Site was originally established by the Atomic Energy Commission (AEC), a predecessor to DOE, as an integrated research, development, and production facility that supported the nation's weapons and energy programs. To reconfigure and consolidate the nuclear complex, DOE has decided to phase out the defense mission at the Mound Site. As a result, the Mound Site was designated an environmental management site and the plant is in the process of being transferred and converted into a research and industrial/commercial site.

Early programs at the Mound Site investigated the chemical and metallurgical properties of polonium-210 and its applications; particularly, the fabrication of neutron and alpha sources for weapon and non-weapon use. Investigations involving uranium, protactinium-231, and plutonium-239 were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, Mound began the separation of stable isotopes.

In the mid-1950s, Mound initiated efforts to develop a large-scale process for the recovery of thorium from a variety of thorium-bearing ores. Even though this project was canceled prior to full-scale operation approximately 1,650 tons of thorium-containing sludge was received at the Mound Site. Due to its corrosivity, the thorium sludge was continually repackaged and relocated. This resulted in a number of thorium-contaminated areas around the site.

Plutonium-238 research and development activity began at the Mound Site in the mid-1950s. From the early 1960s to the late 1970s, Mound processed plutonium-238 for use in heat sources within Radioisotopic Thermal Generators (RTGs). The fabrication of heat sources from plutonium metal was terminated in the mid-1960s. Plutonium oxide processes continued into the late 1970s. After early 1979, Mound did not handle un-encapsulated plutonium-238.

As a result of discovery of volatile organic compounds (VOCs) in groundwater, the Mound Site was placed on the NPL on November 21, 1989. DOE signed a CERCLA Section 120 FFA with EPA, effective October 1990. In 1993, this agreement was modified and expanded to include OEPA.

3.3.2 Enforcement and Agreements - Mound 2000 Process

DOE, EPA, and OEPA had originally planned to address the environmental restoration issues under a set of OUs, each of which would include a number of Potential Release Sites (PRSs). For each OU, the site would follow the traditional CERCLA process: a Remedial Investigation/ Feasibility Study (RI/FS) followed by a ROD, followed by Remedial Design/Remedial Action (RD/RA). After initiating remedial investigations for several OUs, DOE and its regulators realized during a strategic review in 1995 that, for Mound, the OU approach was inefficient. DOE and its regulators agreed that it would be more appropriate to evaluate each PRS or building separately, use removal action authority to remediate them as needed, and establish a goal for no additional remediation other than ICs for the final remedy documented in the ROD. To evaluate any residual risk after all removals have been completed, a Residual Risk Evaluation

(RRE) was to be conducted to ensure the conditions do not pose an unacceptable risk to human health when the parcel is used for industrial/commercial purposes. This process was named the Mound 2000 Process. DOE and its regulators pursued this approach with the understanding that EPA and OEPA reserve all rights to enforce all provisions of the FFA and participation in the Mound 2000 Process does not constitute a waiver of EPA and OEPA rights to enforce the FFA.

The Mound 2000 Process established a "Core Team" consisting of representatives of the DOE Miamisburg Closure Project, EPA, and OEPA The Core Team evaluates each of the PRSs and recommends the appropriate response. The Core Team uses process knowledge, site visits, and existing data to determine whether or not any action is warranted concerning the PRS. The PRSs at Mound were identified based on knowledge of historical land use that was considered potentially detrimental and/or an actual sampling result showing elevated concentrations of contaminants. If a decision cannot be made, the Core Team identifies specific information needed to make a decision (e.g., data collection, investigations). The Core Team also receives input from technical experts as well as the general public and/or public interest groups. Thus, all stakeholders have the opportunity to express their opinions or suggestions involving each PRS. The details of this process are explained in the Work Plan for Environmental Restoration at the Mound Plant. The Mound 2000 Approach (DOE I999c).

Originally, the Mound property was divided into nineteen "release blocks," which are contiguous tracts of property designated for transfer of ownership. Release Blocks D and H were transferred to MMCIC in 1999. The remaining release blocks were reconfigured and renamed parcels. Parcel 4 was transferred to MMCIC in 2001. Parcel 3 was transferred to MMCIC in 2002.

The Mound 2000 Residual Risk Evaluation Methodology (RREM) (DOE 1997) was developed as a framework for evaluating human health risks associated with residual levels of contamination. The RREM is applied to a parcel once necessary remediation has been completed, and the remaining PRSs or buildings in the parcel have been designated as No Further Assessment (NFA). Once the identified environmental concerns have been adequately addressed by the Core Team, a RRE is performed. The RRE documents whether the parcel is acceptable for industrial/commercial redevelopment.

The ROD will document the most appropriate remedy that meets statutory requirements and ensures protection of human health and the environment.

After the ROD is final, DOE will submit documentation to EPA and OEPA that shows the property meets CERCLA 120 (h) (3) requirements. After concurrence is obtained, the title of the property may be formally transferred. Prior to acceptance of the deed for any discrete parcel, the Buyer shall acknowledge that it has reviewed the Mound environmental reports provided by DOE. Acceptance of the deed thereby acknowledges and commits the Buyer to abiding by ICs specified in the ROD.

3.4 Geology and Hydrogeology

The geologic record preserved in the rocks underlying the site indicates that the area has been relatively stable since the beginning of the Paleozoic era more than 500 million years ago. There

is no evidence indicating subsurface structural folding, significant stratigraphic thinning, or subsurface faulting in the underlying bedrock. Limestone, which is interbedded with shale layers, is the uppermost bedrock units at the site. No evidence of solution cavities or cavern development has been observed in any borings or outcrops in the Miamisburg area.

The aquifer system at the Mound site consists of two different hydrogeologic environments: groundwater flow through the bedrock beneath the hills, and groundwater flow within the unconsolidated glacial deposits and alluvium associated within the Buried Valley Aquifer in the Great Miami River valley. The bedrock flow system is dominated by fracture flow and is not considered a highly productive aquifer. The Buried Valley Aquifer is dominated by porous flow with interbedded gravel deposits providing the major pathway for water movement. The unconsolidated deposits are Quaternary Age sediments consisting of both glacial and fluvial deposits. The Buried Valley Aquifer is a highly productive aquifer capable of yielding a significant quantity of water and is designated a sole source aquifer.

4.0 Remedial Actions

Remedial actions at the Mound site consist of ICs and two groundwater remedies. ICs to control land and groundwater use have been established for all of the parcels and Phase I. ICs to control site access have been outlined for the OU-1 area. Groundwater in Phase I is being addressed using monitored natural attenuation for those contaminants that exceed Maximum Contaminant Levels (MCLs). A pump and treatment system was constructed to control groundwater contamination and to minimize exposure to potential receptors by minimizing migration of contaminated groundwater.

4.1 Institutional Controls

ICs represent the all or part of the remedy selected for Parcels D, H, 3,4 and Phase I (Figure 4-1). ICs are controls that reduce the potential for human exposure to residual contamination. ICs are non-engineered means, such as administrative and/or legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Detailed information on ICs applied to these parcels is contained in parcel-specific RODs:

- *Operable Unit 1 Record of Decision* (DOE 1995);
- *Record of Decision, Release Block D* (DOE 1999a);
- *Record of Decision, Release Block H* (DOE 1999b);
- *Parcel 3 Record of Decision* (DOE 2001b); and
- *Parcel 4 Record of Decision* (DOE 2001c).

Ownership of Parcels D, H, 3, and 4 was transferred to MMCIC. As required by public law, DOE declared the parcels as excess and completed the process for property transfer as outlined in CERCLA § 120 (h). EPA also approved of the property transfers. The quitclaim deed for each land parcel informs the property owner of the parcel-specific ICs embedded in the deed as deed restrictions. DOE imposed three deed restrictions on each parcel. In general terms, the three deed restrictions are as follows:

1. Soil cannot be removed from the Mound Site without prior regulatory approval,
2. Groundwater may not be used without prior regulatory approval, and
3. Land use must remain industrial/commercial.

The above three deed restrictions remain attached to the land parcel through subsequent property transfers. The quitclaim deed references the Environmental Summary, which is the final document prepared under the Mound 2000 process for transfer of property. As an exhibit to the quitclaim deed, the Environmental Summary is a critical piece of information that must be passed on to subsequent property owners to ensure that corporate memory is retained on the rationale behind each deed restriction. Recording the quitclaim deed, which includes the Environmental Summary with the Montgomery County, Ohio Recorders Office, ensures that future property owners are aware of the deed restrictions associated with the Mound Site. These deed restrictions are used to ensure protection of human health and the environment for as long as residual contamination levels warrant.

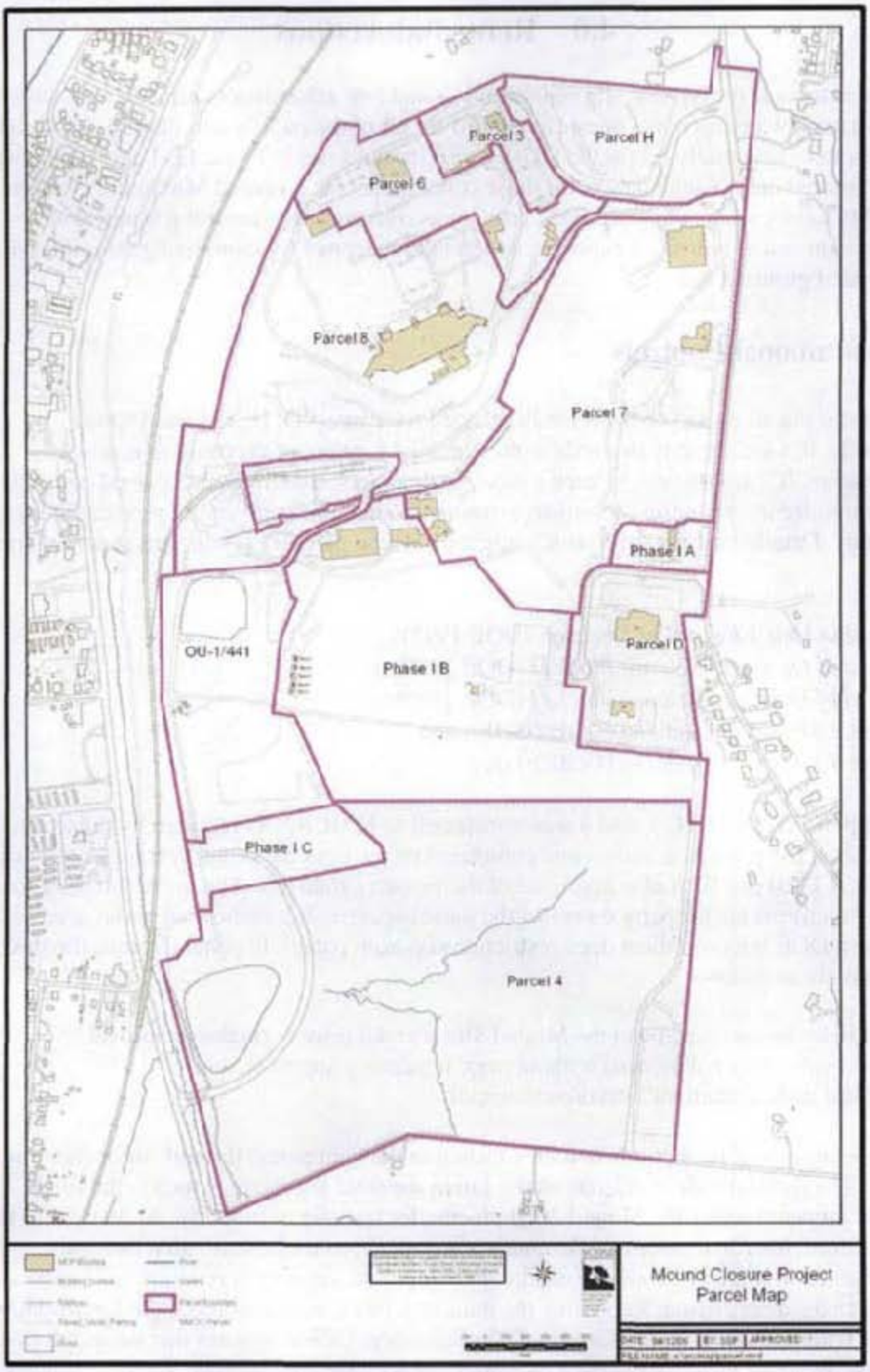


Figure 4-1. Land Parcels at the Mound Plant Site

4.1.1 Remedy Selection

ICs were selected as the remedy to protect future occupants or workers. The primary remediation objective is to ensure that the residual risk associated with each parcel/release block is acceptable for the defined use scenario of industrial/commercial occupants. ICs are imposed through deed restrictions on future land use. DOE or its successors, as the lead agency for the Records of Decision, has the responsibility to monitor, maintain, and enforce ICs.

It was determined based on historical information and contaminant data that no additional remedial action of the PRSs in each land parcel was necessary due to the placement of ICs on future land use. Evaluation of residual soil and groundwater contaminants within each land parcel has resulted in a determination that future users of the land will not be exposed to contaminant levels that would pose unacceptable risks as long as compliance with the deed restrictions are maintained. The soil within each land parcel has not been evaluated for any use other than on-site industrial and/or commercial use. Any off-site disposition of the soil from a land parcel without proper handling, sampling, and management could create an unacceptable risk to off-site receptors.

The selected remedy in each land parcel includes ICs in order to maintain protection of human health and the environmental in the future. ICs adopted will ensure:

- Maintenance of industrial/commercial land use;
- Prohibition against residential use;
- Prohibition against removal of soils from the DOE Mound property boundary without prior approval from the Ohio Department of Health (ODH), OEPA, and EPA.
- Prohibition against the use of groundwater
- Site access for federal and state agencies for the purpose of sampling and monitoring;

4.1.2 Remedy Implementation

The sales contract between DOE and MMCIC, dated January 23, 1998, establishes that DOE will convey the entire Mound Site by discrete parcels, subject to the CERCLA §120 (h) - *Property Transfer of Federal Agency*. Once regulatory approval is received via approval of the Environmental Summary, each parcel of land is transferred via a quitclaim deed. The quitclaim deed contains or refers to restrictions required under CERCLA to ensure that the parcel being transferred is, protective of human health and the environment (i.e., as stipulated in the ROD). Deeds have been recorded for Parcels 3, 4, D, and H. Copies of these deeds are contained in Appendix A.

The preparation of the quitclaim deed, consequently, requires input from the CERCLA process. A copy of the Environmental Summary is also recorded with the deed. The quitclaim deed transfers ownership of the land and establishes that MMCIC will take the land "as is" and "where is." Although the deed does not contain a warranty for the land, DOE maintains responsibility for cleanup if contamination resulting from previous DOE activities (that pose a risk to human health and the environment) is discovered in the future (Ref. 1).

DOE, the regulators, and MMCIC have agreed that the future land used for the site is industrial and have evaluated two scenarios: commercial worker and construction worker. At closure, the following deed restrictions will be in effect across the entire site and are further discussed in subsequent sections:

- Maintenance of industrial/commercial land use and prohibition of residential use,
- Prohibition against the removal of soils from DOE property (as owned in 1998) without approval from EPA, OEPA, and ODH.
- Prohibition against the use of groundwater,
- Site access for federal and state agencies for the purpose of sampling and monitoring, and

4.1.2.1 Industrial Land-use

The third deed restriction prohibits the land use to be anything other than industrial and/or commercial. The Proposed Plan and ROD for each land parcel state that land use will be for industrial and/or commercial use only. The RODs further detail specific land uses that will not be permitted on-site, but the list in the ROD is not meant to be all inclusive. Land parcels may not be used for any residential or farming activities, or any other activities that could result in the chronic exposure of children under 18 years of age to soil or groundwater from the Mound Site.

To date, restricted land uses listed in the RODs include, but are not limited to:

- Single or multi family dwellings or rental units;
- Day care facilities;
- Schools or other educational facilities for children under 18 years of age; and
- Community centers, playgrounds, or other recreational or religious facilities for children less than 18 years of age.

4.1.2.2 Soils

The first deed restriction applied to land parcels transferred to date pertains to the removal of soil from the Mound Site without prior written approval from EPA, OEPA, and ODH. The protocol for obtaining approval is contained in Attachment 7 of the *Operations and Maintenance Plan for the Implementation of Institutional Controls at the 1998 Mound Plan Property*. As OEPA is structured today, the decision authority for removal of soil from the Mound Site resides within the Southwest District Office, located in Dayton, Ohio. Information outlined in Attachment 7 should be provided in writing to OEPA and ODH/Bureau of Radiation Protection for each instance of proposed soil volume transport. Information about the cleanup process, background levels, and toxicology data is contained in or referenced in the *Mound 2000 Residual Risk Evaluation Methodology* (DOE 1997).

4.1.2.3 Groundwater

The second deed restriction prohibits the extraction, consumption, exposure or use in any way of the groundwater underlying the premises, without prior written approval. The protocol for obtaining approval to install a groundwater well is contained Attachment 8 in Operations and Maintenance Plan for the Implementation of Institutional Controls at the 1998 Mound Plan Property. The protocol was developed to assist and inform the public, and future property owners, of the actions needed to request the permission from DOE to use groundwater on the Mound Site. Permission will be based upon a written request to EPA and OEPA.

4.1.3 Operations and Maintenance

ICs comprise all, or part of, the remedy for land parcels at the Mound site that have completed the CERCLA §120 (h) process for property transfer. In general, DOE will assess the effectiveness of ICs applied to the Mound Site on an annual basis. DOE may also, at any time, conduct a review of ICs if there is reason to believe a degradation of any control has occurred. However, the RODs for each parcel state that DOE can petition the regulators to decrease the assessment frequency (e.g., to every 5 years). DOE presents the annual assessment of ICs in an annual report.

The assessment of ICs includes a visual inspection of the site supported with review of aerial photography. A complete description of the assessment of ICs, including a checklist, is contained in the Operation and Maintenance Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property. The checklist is in Attachment 6 of the O&M Plan.

4.2 Operable Unit 1

In June 1995, DOE finalized the Operable Unit 1 Record of Decision (DOE 1995) to address contaminated groundwater in this discrete portion of the Mound Plant Site. OU-1 is located in the southwestern portion of the Mound Site (Figure 4-2) and encompasses an historical waste disposal area (landfill) and the plant production wells. The OU-1 remedial action was designed to control groundwater contamination (primarily low-level volatile organic compounds), to prevent migration of contamination toward the plant production wells, and to minimize exposure to potential receptors (DOE 2002). The pathway of concern consists of leaching of contaminants from site soils or disposed wastes; entrainment in the groundwater flow; and withdrawal by the Mound Plant production wells or by other future wells. The plant production wells were abandoned in October 2005, when the facility was connected to the municipal water supply.

4.2.1 Remedy Selection

The selected remedy for controlling contamination from the soils and groundwater at OU-1 is the collection, treatment, and disposal of groundwater. Surface water controls, ICs to limit site access, and long-term groundwater monitoring are also part of the remedy (DOE 1995). This action is being implemented through the collection and treatment of contaminated groundwater and discharge of the treated water. The chemical properties and hydraulic behavior of the groundwater system are monitored to verify the adequacy of the remedy. The major components

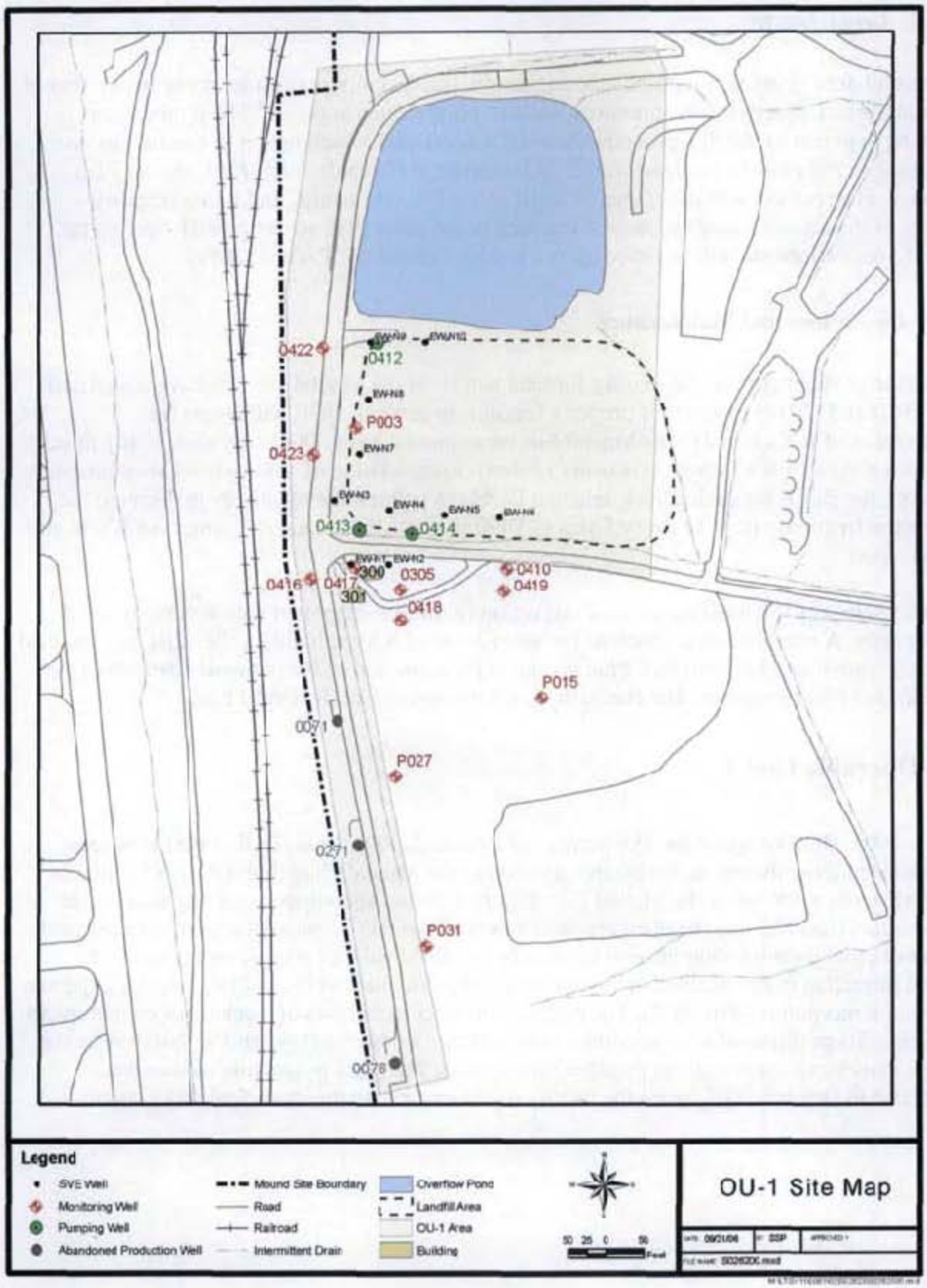


Figure 4-2. Operable Unit 1 Site Map

of this remedy include:

- Extraction of groundwater using 3 conventional wells;
- Treatment of the extracted groundwater to remove the VOCs using air stripping;
- Discharge of the treated groundwater to the Great Miami River;
- Monitoring of the chemical properties of the groundwater system;
- Monitoring of the hydraulic behavior of the groundwater system; and
- Monitoring of the discharge effluent.
- Periodic testing of the OU-1 extraction system (rebound testing).

The remedy also included surface water controls, the implementation of ICs to limit access to the site, and long-term groundwater monitoring. Surface water controls were installed to manage the surface water run-on and run-off and to reduce infiltration into the wastes in the landfill. ICs will be implemented that control land and groundwater use and will be incorporated into deed restrictions developed when ownership of OU-1 transfers. Access restrictions and fencing have been implemented to minimize contact with the soils until such time as the property transfers.

4.2.2 Remedy Implementation

The majority of the activities and components of the OU-1 remedial action were discussed in the previous Five-Year Review (DOE 2001a). The components of the remedy that have been ongoing since the time of the last review are groundwater extraction, treatment, and discharge, groundwater monitoring for chemical and hydraulic behavior, and monitoring of the discharge effluent.

Sampling of selected groundwater monitoring wells for volatile organic compounds is performed quarterly as specified in Section 8 of the *OU-1 Pump and Treatment Operation and Maintenance Plan* (DOE 2000). Table 4-1 summarizes the current monitoring network, which is smaller than that specified in the O&M plan. Reduction in the monitoring network is the result of decommissioning of wells in the OU-1 area. Data are analyzed to determine sustained downward trends as proof of successful capture of the plume. In accordance with the *OU-1 Pump and Treatment Operation and Maintenance Plan*, OEPA is notified prior to collection of groundwater samples and measuring water levels in the selected well.

Table 4-1. Groundwater and Hydraulic Monitoring for OU-1

Location	VOC Analysis	Groundwater Hydraulic Measurement	Location	VOC Analysis	Groundwater Hydraulic Measurement
0305	X	X	0422		X
0410	X	X	0423		X
0416	X		P003		X
0417	X	X	P015	X	
0418	X		P027	X	
0419	X		P031	X	

Closely related to the operation of the system is the measurement of groundwater elevations in the OU-1 area, which are used to verify the satisfactory function of the pumping system. Head measurements are made within the treatment area as specified in Section 8 of the *OU-1 Pump and Treatment Operation and Maintenance Plan* (DOE 2000). Section 8 outlines that head measurements are made using a network of 16 wells. It was later determined that hydraulic capture could be determined through the use of a small network of wells located on the compliance boundaries (Table 4-1).

Since the last Five-Year Review, surface water controls have been constructed and access to the OU-1 landfill has been restricted. Existing ditches were upgraded and new ditches were constructed to prevent run-on of precipitation and to divert run-off to the surface water retention basin located adjacent to the northern boundary of the OU-1 landfill. A temporary fence was installed around the OU-l landfill to restrict access to the area during soil remediation activities. Prior to soil excavation, the site fence was considered to be adequate access restriction to the area.

4.2.3 Operations and Maintenance

O&M requirements are documented in the *OU-1 Pump and Treatment Operational and Maintenance Plan* (DOE 2000).

4.3 Phase I Groundwater (MNA) Remedy

The *Phase I Record of Decision* (DOE 2003 a) was finalized in July 2003 to address groundwater contaminated with TCE in this discrete area through monitored natural attenuation (MNA) and ICs. Phase I is an approximately 52 acre area and lies on the southern border of the plant and is made up of three distinct sections of the site property (Figure 4-3). This area contains monitoring wells that are screened in both the Buried Valley Aquifer (BVA) and the bedrock aquifer system. MNA is being utilized as a remedy for a small section of the bedrock groundwater system contaminated with TCE to ensure the concentration of TCE within the bedrock groundwater is decreasing to levels below the MCL and does not impact the downgradient BVA.

Several wells in this area also exhibit levels of barium, radium (Ra), chromium, and/or nickel that exceed MCLs established under the Safe Drinking Water Act (SDWA). The elevated levels of barium and radium were evaluated and determined to be naturally occurring with the local bedrock matrix serving as the mineral source. The elevated chromium and nickel were determined to be the result of corrosion of the stainless steel well casings. DOE has committed to monitor select wells to confirm the results of the previous investigations where these conclusions were reached.

ICs associated with Phase I are discussed in Section 4.1.

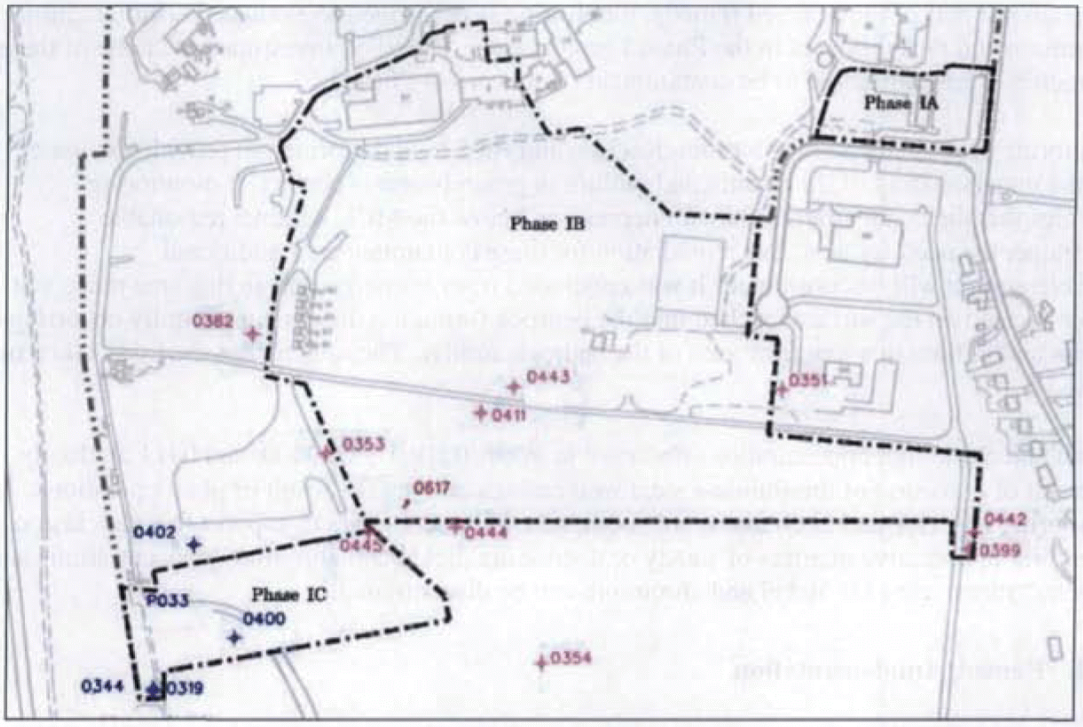


Figure 4-3. Monitoring Network for Phase I Groundwater (MNA) Remedy

4.3.1 Remedy Selection

DOE will monitor groundwater in Phase I for TCE and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation and is not impacting the BVA. A groundwater monitoring program was established to ensure that the BVA is not negatively impacted by TCE contaminated groundwater within the Phase I bedrock aquifer system. The objective of this monitoring is to protect the BVA by verifying that the concentration of TCE in the vicinity of Wells 0411, 0443, and Seep 0617 are decreasing and that TCE is not impacting the BVA. This program may be decreased or terminated with the TCE concentrations observed in 0411, 0443, and seep 0617 meet the MCL for four consecutive sampling events.

Although not part of the selected remedy, monitoring is performed to evaluate barium, radium, chromium, and nickel impact in the Phase I groundwater. Based on investigations, none of these parameters were considered to be contaminant of concern in Phase I.

Monitoring of groundwater for barium, Ra-226, and Ra-228 is performed to provide assurance that the understanding of the barium and radium in groundwater is correct. If monitoring indicates that the concentrations are not decreasing below the MCL within a reasonable timeframe, the need for an active remediation for these contaminants or additional characterization will be considered. It was concluded from investigations in this area that a salt source located on the surface leached into the bedrock formation dissolving naturally occurring

barium and radium in a low flow area of the bedrock aquifer. The salt storage shed was taken out of use.

Nickel and chromium concentrations observed in Wells 0319, 0399, 0400, and 0411 are likely the result of corrosion of the stainless steel well casings and not the result of plant operations. Monitoring is performed to obtain a more comprehensive set of data to support this conclusion. When four consecutive quarters of steady or decreasing nickel and chromium concentrations are collected, monitoring for nickel and chromium can be discontinued.

4.3.2 Remedy Implementation

Under the MNA monitoring program, samples are collected quarterly for selected wells and seeps and analyzed as outlined in Section 4.3 of the Phase I Groundwater Monitoring Plan (DOE 2004a) and in Table 4-2, below.

Table 4-2. Remedy (MNA) Monitoring for Phase I

Monitoring Location	Area	Parameters
Well 0411	Well 0411 Area	Trichloroethylene (TCE) Dichloroethylene (DCE) Vinyl Chloride (VC)
Well 0443		
Well 0353	Downgradient Bedrock Monitoring	
Well 0444		
Well 0445		
Seep 0617		
Well 0400	Downgradient Buried Valley Aquifer Monitoring	
Well 0402		
Well P033		

Confirmatory sampling to support the barium, radium, nickel, and chromium impact are collected quarterly for selected wells as outlined in Table 4-3.

Table 4-3. Confirmatory Monitoring for Phase I

Monitoring Location	Parameters
0319	Chromium, Nickel, Sodium, Chloride
0400	Barium, Ra-226, Ra-228, Chromium, Nickel, Sodium, Chloride
0402	Barium, Ra-226, Ra-228, Sodium, Chloride
0442	Chromium, Nickel, Sodium, Chloride
0443	Chromium, Nickel, Sodium, Chloride
0445	Barium, Ra-226, Ra-228, Sodium, Chloride
P033	Barium, Ra-226, Ra-228, Sodium, Chloride

The contaminant data is evaluated against previous data collected at each location to determine if MNA is adequately addressing groundwater impact and to monitor the geochemical conditions in the aquifer. Trigger levels and response actions have been established for each contaminant as presented in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. The triggers are summarized in Table 4-4.

Table 4-4. Trigger Levels for Phase I MNA Remedy

Location	TCE (µg/L)	DCE (µg/L)	VC (µg/L)	Ra-226/228 (pCi/L)	Barium (mg/L)	Chromium (µg/L)	Nickel (µg/L)
0319	---	---	---	---	---	100	100
0353	5	70	2	---	---		
0400	5	70	2	5	1	100	100
0402	5	70	2	5	1	---	---
0441	3-	70	2	---	---	---	---
0442	---	---	---	---	---	100	100
0443	30	70	2	---	---	100	100
0444	5	70	2	---	---	---	---
0445	5	70	2	75	---	---	---
P033	5	70	2	5	1	---	---
0617 (seep)	16	70	2	---	---	---	---

Exceedence of these trigger levels requires notification to the Federal and State EPA. After notification, the Core Team (EPA, OEPA, and DOE) will determine an appropriate course of action.

4.3.3 Operations and Maintenance

The program to support MNA for the groundwater in Phase I is documented in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan* (DOE 2004a). ICs are evaluated in accordance with the *Operations and Maintenance Plan for the Implementation of Institutional controls at the 1998 Mound Plant Property* (DOE 2003b).

5.0 Progress Since Last Review

5.1 Institutional Controls

The first ROD to stipulate ICs was in 1999. This ROD required annual reviews of the IC remedy at Release Block D. Six annual reports have been prepared assessing the adequacy of ICs for the transferred parcels, since that time. These reports were reviewed as part of this Five-Year Review.

It was discussed in the previous Five-Year Review report (DOE 200la) that RODs for 3 land parcels (D, H, and 4) had been finalized and the parcels transferred to MMCIC. Little discussion regarding the status of ICs was provided in the first report other than noting that the recent RODs for these areas had been recently evaluated in the first annual review report for the implementation of ICs that was submitted in June 2001.

Since the previous Five-Year Review, RODs have been finalized for 2 additional properties (Parcel 3 and Phase I) that contain ICs. Parcel 3 has been transferred to MMCIC; however, Phase I has not been transferred. Annual inspections and reports have been prepared each year, as required.

5.2 Operable Unit 1

5.2.1 Protectiveness Statement from Last Review

Based on the information available at the time of this review, the remedy for OU-1 remains protective of human health and the environment.

5.2.2 Status of Recommendations from Last Review

Recommendations from the last review were to:

- Continue the pump and treat operations; and
- Perform a rebound test when criteria were met.

The OU-1 pump and treatment system continued operation except from May 2003 through February 2004 when a rebound test was performed. This test is discussed in Section 6.7.1.6.

5.2.3 Status of Other Prior Issues

A technical evaluation of OU-1 was performed during 2003 and 2004 to discuss additional information discovered since the lime of the OU-1 ROD and the concerns that this information produced. The following were topics evaluated:

- The discovery of thorium contaminated soil and wastes,

- The uncertainty in potential OU-1 source terms, and

- The development of the OU-1 ROD prior to the implementation of the Mound 2000 decision-making process and the evaluation of PRSs with respect to the remainder of the Mound Site.

A technical working group consisting of representatives of DOE, EPA, OEPA, the City of Miamisburg, MMCIC, and Miamisburg Environmental Safety and Health (MESH). This team identified and evaluated uncertainties in site conditions, technology performance, and regulatory requirements and developed recommendations/options on how best to address the above-stated topics. The OU-1 evaluation included several PRSs that were not originally evaluated during the OU-1 ROD because either the sites had not been identified at the time of the ROD or they were located outside the OU-1 compliance boundary. These additional PRSs were evaluated to determine whether they could potentially impact groundwater and therefore the current OU-1 remedy.

The recommendations from each organization were compiled and presented in the *Operable Unit 1 (OU-1) Technical Team Evaluation - Recommendations to the Mound Core Team* (DOE 2004d). The recommendations were not a consensus of the technical team, but rather an assemblage of each member's concerns and issues that the Core Team should consider.

Based on the recommendations, the Core Team agreed to perform field investigations to assess the site sanitary landfill and cover and the historic landfill. The results of the investigation indicated that no leachate was present in the leachate collection system in the sanitary landfill. The overflow pond was drained and the sediments sampled to further assess the OU-1 area. The results of the sampling supported the previous determination that no further action was necessary in the overflow pond area.

The area of polonium and thorium contaminated soil and waste was further characterized. The data supported the excavation of some of these wastes and soil. Excavation of these materials was completed in 2005. Backfill and restoration were completed in 2006. Approximately 14,978 cubic yards of contaminated soil and debris were excavated from the area.

Additional excavation in the OU-1 area is being planned to facilitate economic redevelopment. It is expected that after completion of the activities, all remaining soil portions of the OU-1 area will be addressed in an amendment to the OU-1 ROD.

The groundwater impact south of the OU-1 area (PRS 414) is considered an extension of the OU-1 groundwater plume. The Core Team determined that this impact is addressed through the implementation of the OU-1 remedy. The Core Team retired PRS 414 as a PRS in 2005.

5.3 Phase I Groundwater (MNA) Remedy

The remedy for Phase I was implemented in 2003, making this the first review of the Phase I Remedy. Two annual reports have been prepared summarizing the data for the MNA remedy. These reports were reviewed as part of this Five-Year Review.

5.4 Operable Unit 4 - Miami-Erie Canal

A no action ROD was approved for the soil in the Miami-Erie canal in 2004. The Miami-Erie canal was never owned by DOE; however, the canal was included on the NPL due to impact from operational and accidental releases from the facility. No property transfer was necessary. As this was a no action ROD, further evaluation was not performed for this Five-Year Review report.

6.0 Five-Year Review Process

6.1 Administrative Components of the Five-Year Review

The Five-Year Review process for the Mound Site began in January 2006 and continued through August 2006. The Five-Year Review process included notifying regulatory agencies, the community, and other interested parties of the start of the Five-Year Review; establishing the review team in consultation with EPA and OEPA; reviewing relevant documents and data; conducting site inspections; and developing and reviewing this second Five-Year Review Report. Each of these elements is discussed below.

EPA and OEPA were informed that the Five-Year Review process had begun on February 16, 2006, which notified them of the annual ICs inspection that was to take place on February 22, 2006. The notice also stated that the annual IC inspection would also serve as part of the Five-Year Review inspection, in preparation for the Five-Year Review report due in 2006. During the annual inspection, the Five-Year Review was discussed.

The Five-Year Review Team consisted of the following members: Art Kleinrath, DOE; Rebecca Cato, SM Stoller, Corp.; Karen Williams, SM Stoller, Corp.; Joyce Massie, SM Stoller, Corp., Tim Fischer, EPA-Region 5; and Brian Nickel, OEPA.

6.2 Community Notification and Involvement

During the annual inspection for the assessment of ICs at the Mound Site, performed in February 2006, representatives of the City of Miamisburg and MMCIC accompanied the review team. Also, personnel from both organizations were interviewed during the records review portion of the IC assessment during each annual review.

6.3 Interviews and Record Review

During each annual assessment of ICs at the Mound site, DOE conducted interviews with representative of the City of Miamisburg Departments of Engineering and Planning. Review of permits with these departments indicated that all work performed by MMCIC or other parties during the reporting period appeared to be covered by permits submitted to the City. In general, the permit review process demonstrated that the City of Miamisburg maintains an adequate record keeping system. All work performed by MMCIC or other parties on the Mound Site that DOE and the City were cognizant of during each 12-month reporting period appeared to be covered by permits submitted to the City. The City implemented an electronic permits database system in 2002 that allows permits to be queried via key word searches.

6.4 Site Inspections

The assessment of ICs consists of a physical walk-over inspection of those parcels that have completed the CERCLA 120(h) requirements for property transfer and discussions with property owners and a review of any record maintained by DOE, the property owner, and the City of Miamisburg Engineering and Planning Departments, During the visual inspection, DOE will determine if new facilities have been constructed, if obvious improvements have been made to the property, and/or if property usage may have changed. These visual inspections are typically performed by a group comprised of DOE, EPA, OEPA, the City of Miamisburg, and MMCIC. Discussions with local government offices and records review will include, at a minimum, contacting the City of Miamisburg Engineering and Planning Departments to obtain information regarding construction or building permits, or exemptions from zoning ordinances, issued for properties that comprise the former DOE Mound Site. The following is a general discussion of each annual inspection. A more detailed discussion can be found in the appropriate report submitted for each inspection.

6.4.1 2002 Annual Inspection

The 2002 report covers Parcels D, H, and 4. which were inspected on May 21,2002. There were no observations of non-compliance with ICs in Parcels D, H, and 4. Site improvements included the installation of an underground telecommunications conduit in Parcel D and the installation of a new asphalt berm and metal/concrete bumpers around the two telecommunications fixtures in stalled in 2001. In Parcel 4 there were many changes to the topography and access to the parcel. MMCIC had built a stormwater retention pond on the southwest side of the parcel and a new telecommunications utility cabinet had been installed. MMCIC had also constructed a road (Vanguard Blvd) off of Old State Route 25. This construction included a new entrance and bridge to access Parcel 4. The road construction was not complete. Soil excavated during these projects had been transported throughout the parcel using internal haul roads. Wells that were present in each Parcel were also inspected to document their condition.

It was concluded in the Annual Assessment of the *Effectiveness of Institutional Controls Applied to the Former Mound Site Property, June 2002* (DOE 2002) that ICs for Parcels D, H, and 4 continued to function as designed, adequate oversight mechanisms appeared to be in place to identify possible violations of ICs, and adequate resources were available to correct or mitigate any problems in the event that a violation were to have occurred. It was recommended as a result of this inspection that a formal check-list be developed to facilitate the walk-over inspections, as well as interview and record reviews

6.4.2 2003 Annual Inspection

The 2003 report covers Parcels D, H, 3, and 4, which were inspected on May 21,2003. There were no observations of non-compliance with ICs in Parcels D, H, and 4. Minor improvements were noted in Parcel D that included the installation of utilities to Building 102. In Parcel 4, it was noted that an area had been clear cut and trenching had occurred: It was later determined that a fiberoptic line had been installed by MMCIC; however, this installation did not require a permit since the installation did not occur in the public right-of-way. MMCIC instituted

mechanisms to ensure that excavation work performed outside the public right-of-way comply with ICs (primarily the removal of soil for the former Mound Plant property). No new improvements were noted in Parcels H and 3. Wells that were present in each Parcel were also inspected to document their condition.

To assist in maintaining ICs, MMCIC ensured that all parties performing work on behalf of MMCIC were aware of, and subject to compliance with ICs. MMCIC accomplished this by embedding the following language into the technical requirements of all Requests for Proposal and Work Orders:

> *Excavated soils must be managed and remain on MMCIC property. Soils from excavations shall be placed at an on-site location, as directed by MMCIC.*

It was concluded in the *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property, June 2003* (DOE 2003d) that ICs for Parcels D, H, 3, and 4 continued to function as designed, adequate oversight mechanisms appeared to be in place to identify possible violations of ICs, and adequate resources were available to correct or mitigate any problems in the event that a violation were to have occurred. It was recommended as a result of this inspection that wells that will continue to be monitored long-term should have labels/ numbers that allow for easy identification of each well in the field. Also, well collars should be maintained in a manner that prevents surface water from entering the well casing. These recommendations were considered to be best management practice and were not related to the effectiveness of the CERCLA remedy for ICs.

6.4.3 2004 Annual Inspection

The 2004 report covers Parcels D, H, 3, and 4 and Phase I (parts A, B, and C), which were inspected on March 15, 2004. MMCIC is the property owner of Parcels D, H, 3, and 4; however, DOE still owns Phase I. There were no observations of non-compliance with ICs in Parcels D, H, 3, and 4 and Phase I. No new improvements were noted in Parcels D, H, and 3 and Phase I. Substantial changes were observed in Parcel 4. MMCIC built a building south of Vanguard Blvd near the entrance at Old State Route 25. Prior to initiating construction, the building was proved with a pre-construction package that included a description of ICs associated with Parcel 4 to ensure that the building was aware that soils could not be removed from the site.

The groundwater monitoring wells and seep associated with the Phase I groundwater remedy were also inspected during this walk-over. The condition of the wells outlined in the *Phase I Groundwater (MNA) Remedy Sampling Plan* was adequate. Excessive vegetation was noted around several wells. Permanent markers were noted on the majority of wells, except 0442, 0445, and P033.

It was concluded in the Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property, July 2004 (DOE 2004e) that ICs for Parcels D, H, 3, and 4 and Phase I continued to function as designed, adequate oversight mechanisms appeared to be in place to identify possible violations of ICs, and adequate resources were available to correct or mitigate any problems in the event that a violation were to have occurred. It was

recommended for this inspection that temporary barriers be placed around Well 0400 to prevent it from being damaged by lawn equipment. These recommendations were considered to be best management practice and were not related to the effectiveness of the CERCLA remedy for ICs.

6.4.4 2005 Annual Inspection

The 2005 report covers Parcels D, H, 3, and 4 and Phase I (parts A, B, and Q, which were inspected on June IS, 2005. MMCKT is the property owner of Parcels D, H, 3, and 4; however, DOE still owns Phase I. There were no observations of non-compliance with ICs in Parcels D, H, 3, and 4 and Phase I. No new improvements were noted in Parcels D, H, and 3 and Phase I. An IC violation was observed on June 23,2005 when teenagers were observed fishing in the retention pond located in Parcel 4. Four signs were installed around this pond that state "Recreational Use Prohibited" to inform people that the pond is not intended for uses such as fishing or swimming. These signs were installed when people were observed fishing in the pond during June 2004. New improvements observed in Parcel 4 included the installation of sidewalks along the southern boundary of the parcel that cuts off access to the old construction entrance to the Mound Site.

The groundwater monitoring wells and seep associated with the Phase I groundwater remedy were also inspected during this walk-over. The condition of the wells outlined in the *Phase I Groundwater (MNA) Remedy Sampling Plan* was adequate, with the exception of Well 0353, which was unlocked and the paint was peeling off the protective casing. Excessive vegetation was observed around several wells. Permanent markers were noted on the majority of wells, except 0442,0445. and P033.

It was concluded in the *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property, July 2005* (DOE 2005b) that ICs for Parcels D, H, and 3 and Phase I continued to function as designed, adequate oversight mechanisms appeared to be in place to identify possible violations of ICs, and adequate resources were available to correct or mitigate any problems in the event that a violation were to have occurred. ICs for Parcel 4 do not appear to be effective. The area has been utilized in a manner inconsistent with industrial/ commercial land use. The use of the retention pond for recreational use is not allowed. It was recommended as a result of this inspection that MMC1C needs to develop and place signs that contain more warnings to the public that will prevent recreational use of the retention pond, as the current signs are not effective.

6.4.5 2006 Inspections

Two walk-over inspections were performed in 2006 to support the Five-Year Review for the Mound Site. These inspections are summarized in the following sections. The Site Inspection Checklist for the review of ICs, the Phase I groundwater remedy, and the OU-1 remedy are contained in Appendix B. Photographs from the walkovers performed for this review are contained in Appendix C.

6.4.5.1 Institutional Controls Inspection

The Mound Site was inspected on February 22, 2006 in accordance with the *Operations and Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property* and associated inspection checklist. The Five-Year Review Checklist was also used during this site inspection. Representatives of the EPA, OEPA, MMCIC, and the City of Miamisburg participated in the inspection. This inspection also served as part of the Five-Year Review inspection to support the Site's CERCLA Five-Year Review Report.

The 2006 report covers Parcels D, H, 3, and 4 and Phase I (parts A, B, and C), which were inspected on February 22, 2006. MMCIC is the property owner of Parcels D, H, 3, and 4; however, DOE still owns Phase I. There were no observations of non-compliance with ICs in Parcels D, H, 3, and 4 and Phase I. No new improvements were noted in Parcels D, H, 3 and 4 and Phase I.

It was concluded in the *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property, June 2006* (DOE 2006d) that ICs for Parcels D, H, and 3 and Phase I continued to function as designed, adequate oversight mechanisms appeared to be in place to identify possible violations of ICs, and adequate resources were available to correct or mitigate any problems in the event that a violation were to have occurred. The recommendation for signage changes in 2005 has not been implemented. The area remains with the same issues of certainty that were identified in 2005. No recommendations significant to the protectiveness of the remedies were made as a result of this inspection.

6.4.5.2 Phase I Groundwater

Also, during the walk-over of the Phase I area, the eight groundwater monitoring wells and seep that are included in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan* were also inspected. Though not necessary to the protectiveness of the remedy, but as best management practice, the condition of the monitoring wells needs to be improved. The protective casings and concrete pads are in disrepair and many do not have adequate protection (i.e., bollards) from vehicular traffic. Excessive vegetation is present around all the monitoring wells and the seep. Permanent identification markers are missing from Wells 0442, 0445, and P033.

6.4.5.3 OU-1 Landfill

The Operable Unit 1 area of the site was inspected by S. M. Stoller personnel on July 13,2006. This walk over consisted of a visual survey of the physical aspects of the OU-1 remedy and included the landfill area, stormwater controls, site fencing, and the OU-I Pump and Treatment/ Soil Vapor Extraction system. This inspection was performed using the CERCLA Five-Year Review Checklist.

The general condition of the OU-1 area is adequate. Removal actions in the landfill area were completed this year and vegetation has not been fully restored. Access roads are in minor disrepair, but are accessible for inspection of the OU-1 area and operation of the treatment

system and stormwater controls.

Access and ICs associated with OU-1 consist of fencing around the landfill proper. This fencing is temporary in nature, meaning that it is free standing and not permanently installed with posts secured in concrete. The fencing was in good condition and extended around the complete perimeter of the landfill area.

The landfill cover is in satisfactory condition. Several small trees were observed on the northern side of the landfill cover. No evidence of slope instability was observed. The southwestern comer of the landfill shows the effects of the recent removal action performed in that area. The area appears to be graded in a fashion to prevent the ponding of water. As note previously, vegetation has not been completely established on the recently excavated areas.

Stormwater run-on and run-off is controlled along the edges of the landfill using swales and ditches. Stormwater along the eastern side of the landfill is directed to the stormwater retention basin on the northern side of the landfill. Although vegetation is present in the swales along the eastern side of the landfill, stormwater flow is not impeded. The stormwater retention basin appears to be functioning adequately. The overflow structure was in good condition. Stormwater from this area is monitored in accordance with National Pollutant Discharge Elimination System (NPDES) permit 1IO00005*ID.

Stormwater along the western side of the landfill is control by concrete lined ditches that discharge to the south and flow beneath the access road near Buildings 300 and 301. Excessive vegetation is present in the ditch that could lead to deterioration of the concrete and impede surface water flow in the future. The drainage in this area has also been impeded by site remediation activities that have resulted in a reduction or elimination of the ditch south of this area. Ponding water was observed in the southwestern corner of the landfill area.

During the walk-over of the OU-1 area, the ground water monitoring wells that are included in the *OU-1 Pump and Treatment Operations and Maintenance Plan* were also inspected. Though not necessary to the protectiveness of the remedy, but as best management practice, the condition of the monitoring wells needs to be improved. The protective casings and concrete pads are in disrepair and many do not have adequate protect (i.e., bollards) from vehicular traffic. Excessive vegetation is present around all the monitoring wells.

6.4.5.4 OU-1 Pump and Treatment System

The OU-1 Pump and Treatment system is composed of 3 extraction Wells (0412, 0413, and 0414) located along the southern and western edge of the landfill area that create a hydraulic barrier to prevent the migration of VOC impacted groundwater. Water extracted from the 3 extraction wells is directed to Building 300 where VOC contamination is removed using an air stripping system. The effluent from this system is monitored and discharged in accordance with the CERCLA Authorization to Discharge (ATD) under NPDES (Authorization Number 1IN90010*BD). Visual inspection of the physical components of the treatment system indicates that the building and system is in good condition. The area around Building 300 is in minor disrepair, primarily poor housekeeping. The 3 extraction wells are in minor disrepair, mainly as a

result of the previous excavation activities performed in the landfill area.

A soil vapor extraction (SVE) system was added to the pump and treat system in 1997 and consists of 23 vapor extraction wells installed along the western and southern side of the landfill. During excavation activities in 2005, some of the vapor extraction wells were removed and were not re-installed upon site restoration. The system presently consists of 10 vapor extraction wells. The vacuum pumps are housed in Building 301. Emissions from the system are considered de minimis and no monitoring is required. Visual inspection of the physical components of the treatment system indicates that the building and system are in good condition. The area around Building 301 and the SVE wells are in minor disrepair, primarily poor housekeeping. Excessive vegetation is present around the SVE wells on the western side of the landfill.

6.5 Document Review

The following sections list the documents that were reviewed as part of this Five-Year Review. The documents are categorized into the following:

6.5.1 Basis for Response Action

The documents listed in Table 6-1 identify the background and goals of the remedies and any changes in laws and regulations that may affect the response action. These documents also provide background information on the remedial actions, basis for action, cleanup levels, applicable or relevant and appropriate requirements (ARARs), and address community concerns and preferences.

Table 6-1. Documents Supporting Basis for Response Action at the Mound Site

Document	Purpose	Use for Review
Record of Decision for Release Stock D, Mound Plant, Miamisburg. Ohio. February 1999	Record selected remedial decision	Remediation Goals Background Basis for Action Community Concerns ICs ARARs
Record of Decision for Release Block H, Mound Plant, Miamisburg. Ohio. June 1999	Record selected remedial decision	Remediation Goals Background Basis for Action Community Concerns ICs ARARs
Parcel 4 Record of Decision, Mound Plant, Miamisburg. Ohio, February 2001	Record selected remedial decision	Remediation Goals Background Basis for Action Community Concerns ICs ARARs
Parcel 3 Record of Decision, Mound Plant, Miamisburg, Ohio. September 2001	Record selected remedial decision	Remediation Goals Background Basis for Action Community Concerns ICs ARARs
Operable Unit 1 Record of Decision, Mound Plant. Miamisburg, Ohio. June 1995	Record selected remedial decision	Remediation Goals Background Basis for Action Community Concerns Cleanup Levels Operational Criteria ICs ARARs
Phase I Record of Decision. Miamisburg Closure Protect, July 2003	Record selected remedial decision	Remediation Goals Background Basis for Action Cleanup Levels Community Concerns ICs ARARs
Miami-Erie Canal Record of Decision. Miamisburg Closure Project, September 2004	Record selected remedial decision	Background Basis for Action Community Concerns ARARs

6.5.2 Implementation of the Response

The documents listed in Table 6-2 furnish information about design assumptions, design plans or modifications and documentation of the response at the site.

Table 6-2. Documents Supporting Implementation of the Response at the Mound Site

Document	Purpose	Use for Review
Final Report on the Implementation of Operable Unit 1 Record of Decision	Documents the approach used to evaluate hydraulic capture for OU-1 pump and treat (P&T)	Data evaluation

6.5.3 Operations and Maintenance

O&M documents listed in Table 6-3 describe the ongoing measures at a site to ensue the remedy remains protective. They provide the structure for O&M at the site and confirm that O&M is proceeding as planned.

Table 6-3. Documents Supporting Operations and Maintenance at the Mound Site

Document	Purpose	Use for Review
OU-1 Pump and Treatment Operational and Maintenance Plan, March 2000	Provides the general guidelines for effective operation of the pump and treatment system.	O&M Requirements Monitoring Requirements Reporting
Operational and Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property, 2004	Provides the details for the implementation of ICs for all parcels/phases at the Mound Site and the process for evaluation of the effectiveness of ICs	O&M Requirements Reporting
Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan, September 2004	Provides the groundwater monitoring approach for the MNA remedy in Phase I	Monitoring Requirements Reporting
Long-Term Surveillance and Maintenance Plan for the U.S. Department of Energy Miamisburg Closure Project, Mound Site, Miamisburg, Ohio, Vol. 1 (Draft), September 2005		O&M Requirements Commitments Reporting

6.5.4 Remedy Performance

Monitoring data, progress reports, and performance evaluation reports listed in Table 6-4 provide information that can be used to determine whether the remedial actions continue to operate and function as designed and has achieved, or is expected to achieve, cleanup levels.

Table 6-4. Documents Supporting Remedy Performance at the Mound Site

Document	Purpose	Use for Review
CERCLA Five-Year Review Report for the Operable Unit 1 Remedy at the U.S. Department of Energy Miamisburg Environmental management Project, September 2001	Records status and protectiveness of remedy	History Update Status
Annual Assessment of the Effectiveness of Institutional Controls applied to the former Mound Site Property, June 2001	Documents results of annual inspection and IC status	IC status
Annual Assessment of the Effectiveness of Institutional Controls applied to the former Mound Site Property, June 2002	Documents results of annual inspection and IC status	IC status
Annual Assessment of the Effectiveness of Institutional Controls applied to the former Mound Site Property, June 2003	Documents results of annual inspection and IC status	IC status
Annual Assessment of the Effectiveness of Institutional Controls applied to the former Mound Site Property. July 2004	Documents results of annual inspection and IC status	IC status
Annual Assessment of the Effectiveness of Institutional Controls applied to the former Mound Site Property. July 2005	Documents results of annual inspection and IC status	IC status
Phase 1 Groundwater Monitoring Report (January 2005 through November 2005). May 2006	Documents sampling results and conclusions regarding effectiveness of MNA remedy	Site status Monitoring results
Operable Unit 1 (OU-1) Technical Team Evaluation. June 2004	Provides recommendations to the Mound Core Team regarding remaining uncertainties associated with the OU-1 area	History Site status Recommendations/Options regarding uncertainties
Operable Unit 1 Groundwater Rebound Test. April 2005	Documents the results of a rebound test performed in the OU-1 area	System Performance Site Status

Table B-4. Documents Supporting Remedy Performance at the Mound Site (cont)

Annual Site Environmental Report for Calendar Year 2002. September 2003	Summarize activities and monitoring results annually	Site Status Monitoring Results
OU-1 Monthly Summaries, entries in the ER Monthly report. 2001 through 2005	Documents the monthly operation and performance of the OU-1 system	System Performance

6.5.5 Legal Standard Regarding Remedial Action

The legal documentation listed in Table 6-5 includes information pertinent to the site that specified responsibilities for conducting remedial action, implementing institutional and access controls, and O&M activities.

Table 6-5. Documents Supporting Legal Standards Regarding Remedial Action at the Mound Site

Document	Purpose	Use for Review
FFA under CERCLA Section 120: In the Matter of the U.S. DOE'S Mound Plant (1993)	Documents the commitments and agreements regarding the implementation and operation of remedies. Also documents the responsibilities of other agencies	Required Actions Roles of Other Agencies
Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach, 1999	Documents the process for evaluating potential release sites (PRSs).	Site conditions
The Mound 2000 Residual Risk Evaluation Methodology (RREM), Mound Plant, 1997	Documents the methodology for evaluating the residual risk remaining for each parcel.	Site conditions
Site Sales Agreement	Documents how DOE will convey the Mound Plant Property to MMCIC by Discrete parcels, subject to CERCLA Section 120(h) and the condition the property will be left in upon completion of remedial actions.	Required Actions

6.6 Risk Information Review

As documented in the Residual Risk Evaluations for each parcel, the risks from carcinogens and non-carcinogens to current and future occupants were evaluated. In those analyses, the type of occupant was limited to an industrial and/or commercial use scenario and was represented by a construction worker and a site employee (office employee). The review of risk information included an evaluation of ARARs, exposure assumptions, and remedial action objectives used at the time of remedy selection.

6.6.1 Applicable or Relevant and Appropriate Requirements

Table 6-6 is a summary of the chemical-specific ARARs identified in the RODs. No changes in the risk parameters or ARARs were identified that would call into question the protectiveness of the remedies selected at the Mound site.

Table 6-6. Summary of ARARs that Affect the Protectiveness of Remedies Citation

Citation	Title	Parcel
OAC 3745-81-11	Maximum Contaminant Levels for Inorganic Chemical	Release Block D Release Block H Parcel 3 Parcel 4 Phase I Operable Unit 1
OAC 3745-81-12	Maximum Contaminant Levels for Organic Chemical	Release Block D Release Block H Parcel 3 Parcel 4 Phase I Operable Unit 1
OAC 3745-81-13	Maximum Contaminant Levels for Turbidity	Release Block D Release Block H Parcel 3 Parcel 4 Phase I Operable Unit 1
OAC 3745-81-15	Maximum Contaminant Levels for Radium 226, 228, and Gross Alpha	Release Block D Release Block H Parcel 3 Parcel 4 Phase I Operable Unit 1
OAC 3745-81-16	Maximum Contaminant Levels for Beta Particle and Photon Radioactivity	Release Block D Release Block H Parcel 3 Parcel 4 Phase I Operable Unit 1
40 CFR 141.11 to 141.16	Safe Drinking Water Act - Maximum Contaminant Levels	Phase I Operable Unit 1

6.6.2 Exposure Pathways

The site conceptual model for Mound provided the basis for evaluating human exposure scenarios and was defined in the *Residual Risk Evaluation Methodology* (DOE 1997). Based on the industrial/commercial land-use scenario, the significant pathways for potential exposure at the Mound site for a future construction worker included ingestion, dermal contact, inhalation of fugitive dust, external radiation from surface soil/sediment and subsurface soil, and ingestion, derma) contact, and inhalation of vapors from groundwater. The significant pathways for an office worker included ingestion, inhalation of fugitive dust and external radiation from surface soil and ingestion of groundwater.

The risk evaluation for Operable Unit 1 was performed prior to the Mound 2000 process. Risk was evaluated under the more conventional Baseline Risk Assessment approach where a future resident farmer scenario was evaluated. An assessment for the selected industrial future land-use was also performed that included soil remediation to industrial standards and no onsite groundwater use or standards. A summary discussion of the exposure assessment is presented in the *Operable Unit 1 Record of Decision* (DOE 1995). It was determined that the most immediate point of exposure for contaminants originating in OU-1 were the plant production wells.

The toxicological properties of each contaminant of concern were evaluated by reviewing the Integrated Risk Information System and/or Health Effects Assessment Summary Table data. These data sets provided no-observable effect levels and slope factors for chemicals and radionuclides encountered at Mound.

6.6.3 Remedial Action Objectives (RAOs)

The primary remedial action objective (RAO) for IC remedies at each parcel is to ensure that the residual risk associated with the parcel is acceptable or the defined use scenario of industrial and/or commercial occupants.

The RAO for soil in OU-1 is to prevent or reduce infiltration and migration of contaminants that would result in groundwater contamination in excess of remediation goals. Also, soil contaminants should not result in an aggregate excess cancer risk greater than 1×10^{-5} or a hazard index greater than I for occupational exposures.

The RAO for groundwater in OU-1 is to prevent ingestion of water with contaminant concentrations in excess of the remediation goals and to control or reduce to remediation goals the contaminant concentrations in the aquifer adjacent to OU-1. The preliminary remediation goals (PRGs) are shown in Table 6-7.

Table 6-7. Preliminary Remediation Goals for Groundwater in OU-1

Parameter	Risk-Based PRG[a]	SDWA MCL	Proposed PRG
Actinium-227 (pCi/L)	0.1	NL	2
Plutonium-238 (pCi/L)	0.2	15	0.2
Plutonium-239/240 (pCi/L)	0.2	15	0.6
Tritium (pCi/L)	900	20,000	3,000
Chlordane (alpha) (µg/L)	0.06	2	-.06
1,2-DCA(µg/L)	0.1	NL	0.1
cis-1,2-DCE(µg/L)	60	70	60
Perchloroethene (µg/L)	1	5	5
Tetrachloromethane (µg/L)	0.2	5	0.2
TCE (µg/L)	2	5	2
Trichloromethane (µg/L)	0.2	100	2
Vinyl Chloride (µg/L)	0.02	2	1

PRG Preliminary Remediation Goal
NL Not listed
SDWA Safe Drinking Water Act
a Risk-based PRGs concentration from residential water use scenario.

The groundwater constituents in Phase I were compared to the MCLs and the results were used in evaluating compliance with ARARs. Groundwater in Phase I exceeded the MCLs for TCE (5 milligrams per liter [mg/L]), barium (2 mg/L), combined Ra-226 and Ra-228 (5 picoCuries per liter [pCi/L]), nickel (100 micrograms per liter [µg/L]), and chromium (100 µg/L).

The RAOs documented in the RODs are being met by the selected remedies.

6.6.4 Changes in Risk Assumptions since last Five-Year Review

For the evaluation of risk, the Mound Plant production wells were used as the point where exposure to contaminated groundwater would occur. These wells were screened in the BVA. The Mound Plant production wells no longer exist. These wells were removed from service in October 2005 when the facility was placed on the city water supply. However, for future land use, the assumption of an on-site production well screened in the BVA, similar to the Mound Plant production wells, is still valid.

6.7 Data Review

Data will be discussed for each remedy: Phase I and OU-1. Annual reports have been prepared for the Phase I MNA Groundwater Remedy in 2004 and 2005. Data for the OU-1 pump and treat (P&T) system has been reported monthly project reports prepared by the remediation contractor.

6.7.1 Operable Unit 1

The performance of the P&T system is assessed by three different metrics:

- VOC mass removal and mass removal rate
- System uptime verses down time
- Hydraulic containment of the contaminant plume/area

When these three factors are maximized, then the system is operating in an acceptable manner. A large amount of data has been collected for the OU-1 P&T system to monitor the performance of the system. This data includes water level measurements, groundwater samples, effluent samples, influent samples, and volumes treated.

In consideration of the anticipated treatment time required for the conventional P&T system to remediate the OU-1 area, the SVE and air sparge systems were installed and put into operation in 1997 to expedite the removal of VOCs from soils and groundwater. It was later (about 1 year) determined that the air sparge system was not functioning properly due to site conditions and the operation of that portion of the system was terminated. Although the operation of the SVE system is not stipulated in the ROD, a significant amount of VOC contamination has been removed by this system. A portion of the SVE system was removed in 2005 to support the excavation activities in the landfill area. It was determined that the removed portion did not have to be replaced primarily due to the removal of the soil source in that area.

6.7.1.1 Hydraulic Capture

Local hydraulic gradients are determined by conducting three point evaluations using monitoring wells that straddle the compliance boundary. Two sets of 3 monitoring wells are currently being utilized to determine if hydraulic containment is achieved. Wells 0305,0410, and 0417 are used to verify containment at the southern boundary and Wells 0422,0423, and P003 are used to verify containment at the western boundary. The compliance boundaries are the west and south access roads located adjacent to the landfill area. The groundwater gradients are calculated to determine whether groundwater flow direction has been reversed and flow is coming inward across the compliance boundaries. It was assumed from a groundwater model that complete hydraulic control can be assumed if a 0.002 foot/foot average inward gradient is maintained across at least a 25-foot wide border centered on the compliance boundary. A summary of the data collected since 2002 is presented in Table 6-8. Although the 0.002 ft/ft gradient has not been continuously maintained across the compliance boundary, the results show that the system

has been capturing the contaminated groundwater by maintaining a positive gradient across the compliance boundaries.

Table 6-8. Summary of Hydraulic Gradients for the OU-1 P&T System

Date	Hydraulic Gradient (ft/ft)		Date	Hydraulic Gradient (ft/ft)	
	0422/0423/P003	**0305/041/0417**		**0422/0423/P003**	**0305/041/0417**
1/2/2002	0.0024	0.0026	1/31/2005	0.0021	0.0019
2/28/2002	0.0017	0.0031	3/3/2005	0.0022	0.0031
4/2/2002	0.0020	0.0036	3/30/2005	0.0048	0.0018
5/1/2002	0.0021	0.0036	4/29/2005	0.0049	0.0027
5/30/2002	0.0023	0.0024	5/31/2005	0.0020	0.0027
8/28/2002	0.0009	0.0038	7/5/2005	0.0020	0.0027
9/26/2002	0.0009	0.0040	8/3/2005	0.0019	0.0027
10/31/2002	0.0009	0.0036	9/2/2005	0.0022	0.0029
12/2/2002	0.0007	0.0046	10/3/2005	0.0021	0.0023
2/3/2003	0.0010	0.0039	11/3/2005	0.0022	0.0027
3/3/2003	0.0011	0.0034	12/5/2005	0.0026	0.0024
3/27/2003	0.0023	0.0034	12/21/2005	0.0010	0.0046
5/5/2003	0.0017	0.0052	1/4/2006	0.0027	0.0021
4/5/2004	0.0020	0.0034	2/2/2006	0.0026	0.0027
5/5/2004	0.0018	0.0030	3/2/2006	0.0023	0.0030
6/1/2004	0.0021	0.0040	3/30/2006	0.0024	0.0017
6/29/2004	0.0018	0.0037	4/26/2006	0.0025	0.0025
8/31/2004	0.0014	0.0037	6/1/2006	0.0024	0.0027
10/4/2004	0.0017	0.0047	7/5/2006	0.0020	0.0026
11/2/2004	0.0025	0.0084	8/1/2006	0.0025	0.0029
11/30/2004	0.0012	0.0038			

Positive gradients indicate inward flow

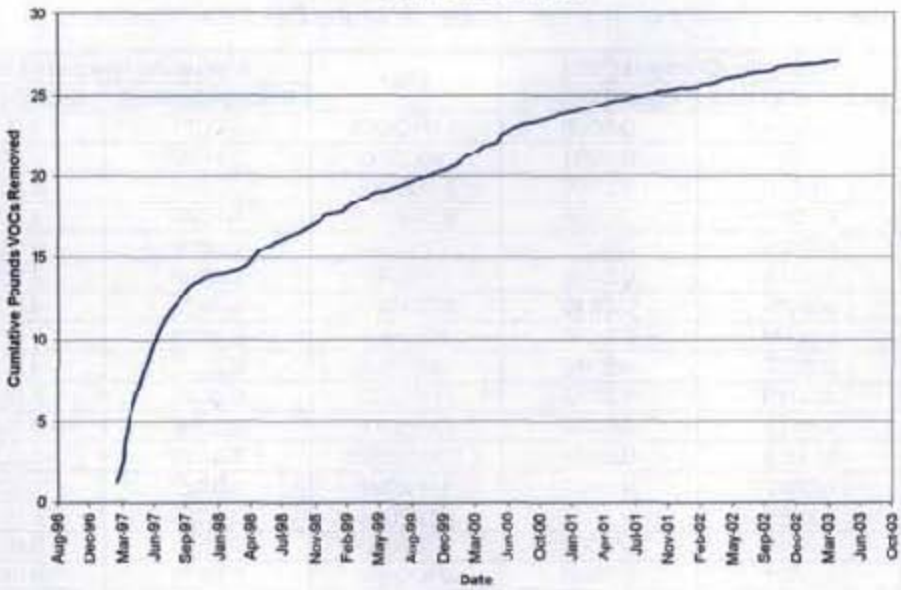


Figure 6-1. Mass Removed by OU-1 Pump and Treatment System

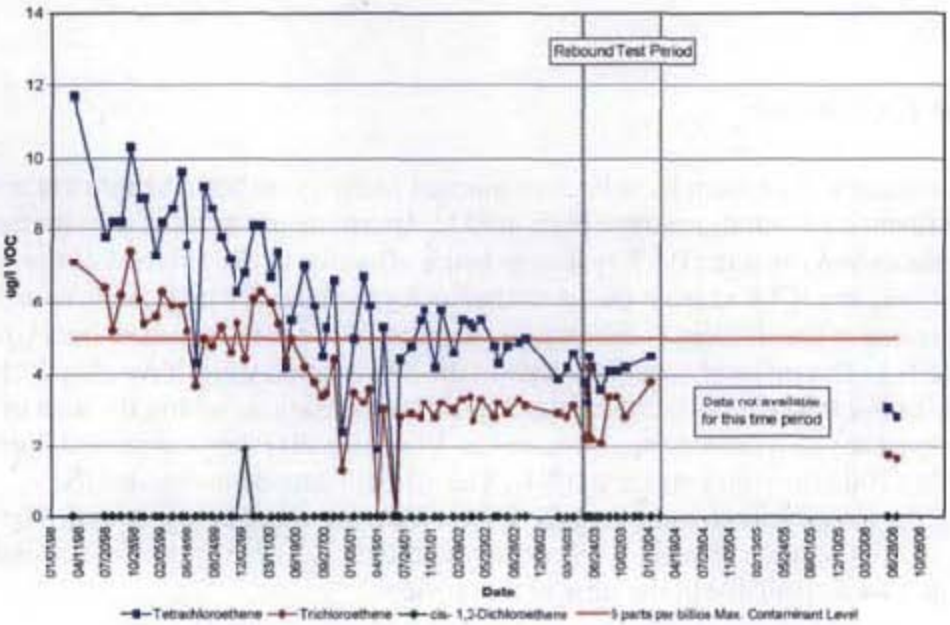


Figure 6-2. VOC Concentrations in Extraction Well 0412

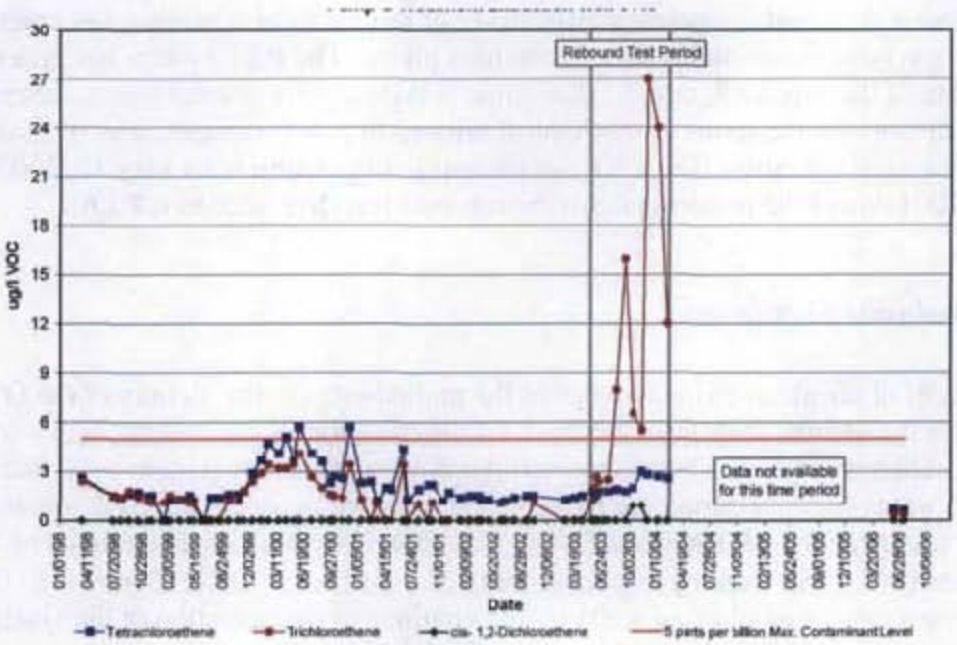


Figure 6-3. VOC Concentrations in Extraction Well 0413

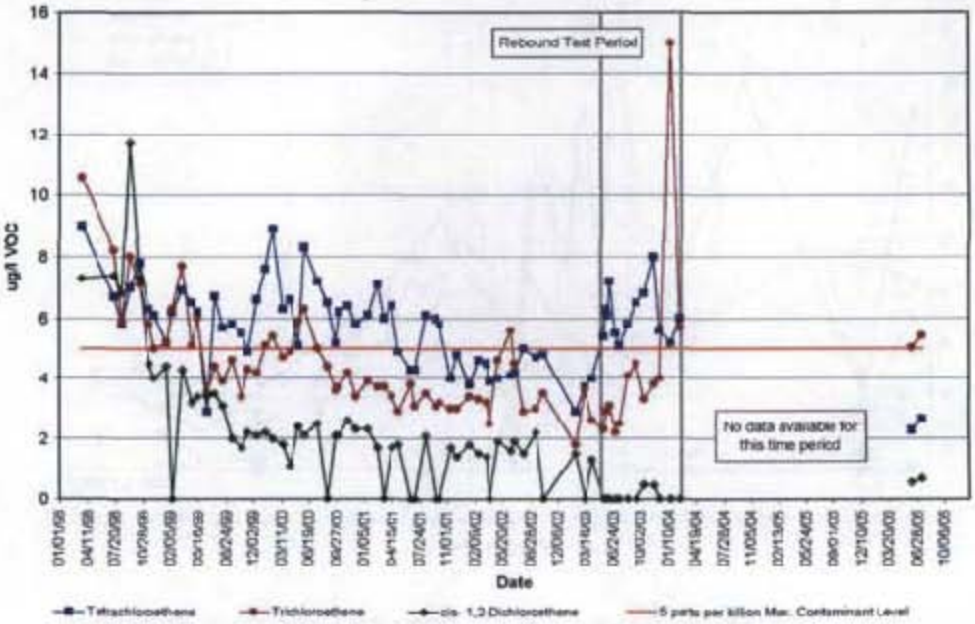


Figure 6-4. VOC Concentrations in Extraction Well 0414

6.7.1.2 System Performance

The VOC contaminants of concern have been monitored monthly on both the influent and effluent. The influent concentrations have been used to determine the mass of contaminants removed. This data shows that the P&T system is being effective in the removal of the

contaminants of concern (COCs) from the groundwater by the rate of which the mass of the contaminants present in the influent is decreasing. A graph of the mass removed over time is shown in Figure 6-1. The influent concentrations in the 3 extraction wells have also decreased over time (Figures 6-2 through 6-4), indicating that the concentrations within the area of groundwater impact are also decreasing. Increases in VOC concentrations are noted during the rebound test (May 2003 through February 2004). The effluent data demonstrates the effectiveness of the air stripper in removing the COCs from the water being treated. The concentrations of VOCs in the effluent are generally non-detect. These graphs were constructed using the data that were available at the time of this review.

The P&T system is designed to operate continuously or as near to as continuous as practicable as it is the primary system that contains the contaminant plume. The P&T system has generally run about 90 percent of the time each month. Downtime is typically for general maintenance activities. Exceptions are the result of mechanical failures or power outages, which resulted in shorter percentages of operation. The P&T system was not operating from May 12, 2003 through February 23, 2004 due to the performance of the rebound test (See Section 6.7.1.6).

6.7.1.3 Groundwater Monitoring

The measurement of chemical characteristics of the groundwater in the vicinity of the OU-1 P&T system provides the definite long-term feedback on the operation of the system. Wells on the western and southern compliance boundaries exhibit downward trends (Figure 6-5). Increased concentrations were observed during the rebound test; however, concentrations continued to decrease after restarting the P&T system. Downgradient wells exhibit concentrations of TCE and Perchloroethene (PCE) less than the respective PRG of 1 µg/L and 5 µg/L (Figure 6-6). This trend in the downgradient monitoring wells should continue as the operation of the system progresses, since the system will cut off the plume from its source.

6.7.1.4 Compliance Monitoring

The effluent from the pump and treatment system is monitored and discharged in accordance with the CERCLA ATD under NPDES (Authorization Number 1IN90010*BD) (Table 6-9). These data are reported monthly to OEPA. There has not been an exceedence of any of the discharge limits during 2001 through 2006. The VOC data from the effluent is typically non-detect, indicating that system is effective at removing the organic compounds from the groundwater.

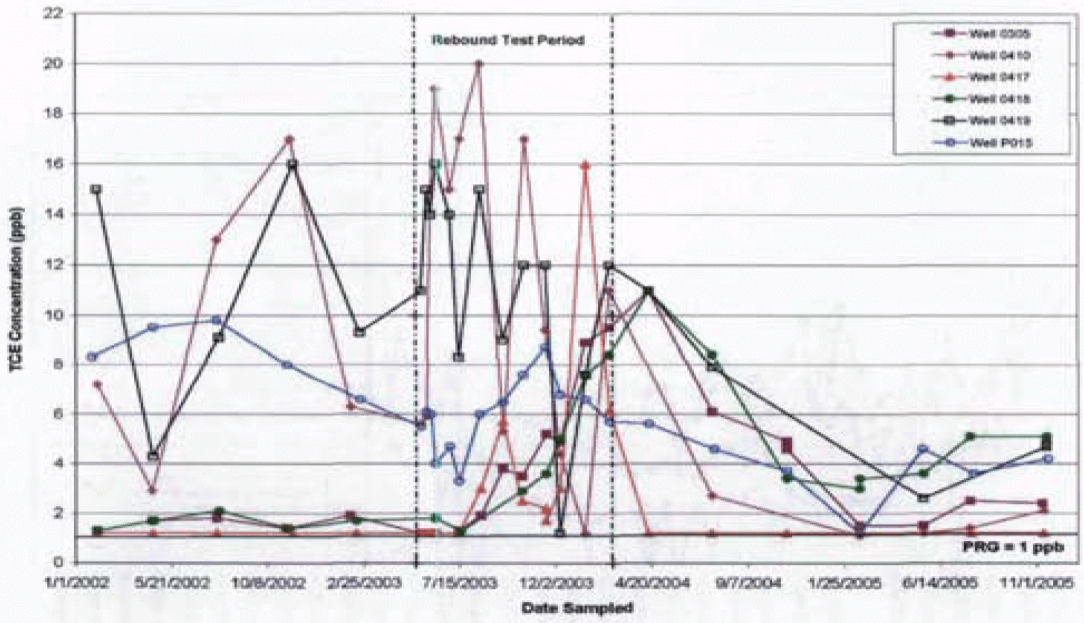


Figure 6-5. VOC Concentrations in Wells Along the Compliance Boundaries

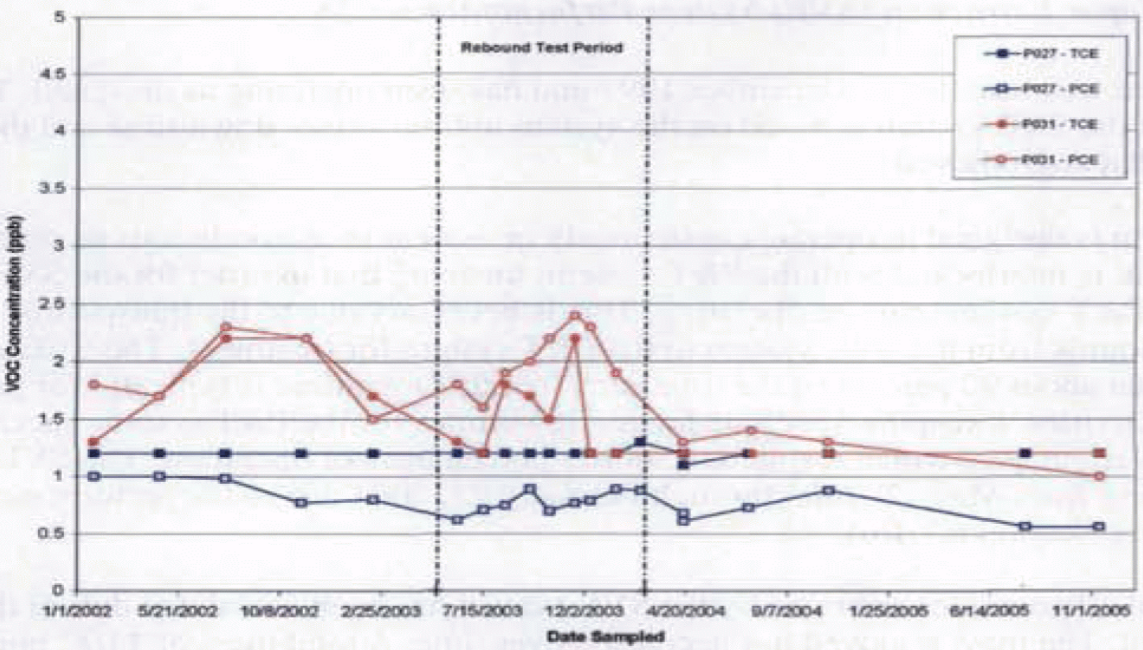


Figure 6-6. VOC Concentrations in Wells Downgradient of OU-1

Table 6-9. Monitoring Requirements for Outfall 003

Parameter	Discharge Limits			Sample Type	Frequency
	Maximum	Minimum	Monthly		
Flow Rate - MGD	---	---	---	24 hr total	daily
pH- S.U.	9.0	6.5	---	grab	weekly
Dissolved Oxygen - mg/L	---	---	---	24 hr composite	monthly
Copper, total recoverable - µg/L	---	---	---	grab	monthly
Mercury, total (low level) - µg/L	2200	---	23	24 hr composite	monthly
CBOD, 5 day - mg/L	---	---	---	grab	monthly
Carbon Tetrachloride - µg/L	10	---	5	grab	monthly
Chloroform - µg/L	10	---	5	grab	monthly
Methylene Chloride - µg/L	10	---	5	grab	monthly
Tetrachloroethylene - µg/L	10	---	5	grab	monthly
Trichlorofluoromethane - µg/L	10	---	5	grab	monthly
1,1,1 -Trichloroethane - µg/L	10	---	5	grab	monthly
1,2-trans-Dichloroethylene - µg/L	10	---	5	grab	monthly
Vinyl Chloride - µg/L	10	---	5	grab	monthly
Trichloroethylene - µg/L	10	---	5	grab	monthly
cis-1,2-Dichloroethylene - µg/L	10	---	5	grab	monthly

6.7.1.5 Soil Vapor Extraction (SVE) System Performance

The SVE system was installed in December 1997 and has been operating as designed. The performance of the SVE system is based on the system uptime verses down time and the mass of contaminants that are removed.

The P&T system is designed to operate continuously or as near to as continuous as practicable. The SVE system is interlocked with the P&T system; meaning that in order for the SVE system to operate, the P&T system must be operating. This is necessary due to the transport of condensation liquids from the SVE system to the P&T system for treatment. The SVE system has generally run about 90 percent of the time each month. Downtime is typically for general maintenance activities. Exceptions include longer downtimes for the P&T system, mechanical failures, or power outages, which resulted in shorter percentages of operation. The SVE system was not operating from May 12, 2003 through February 23, 2004 due to the performance of the rebound test (See Section 6.7.1.6).

The mass of volatile organics removed by the SVE system has been calculated during the treatment period. The mass removed has decreased over time. A total mass of 4,032 pounds of

VOCs has been removed by the SVE through February 2005. A summary of the mass removed each year is provided below:

December 1997 - December 1998	2,594 pounds
January 1999 - December 1999	403 pounds
January 2000 - December 2000	722 pounds
January 2001 - December 2001	61 pounds
January 2002 - December 2002	73 pounds
January 2003 - February 2003	52 pounds
March 2003 - March 2005	127 pounds

6.7.1.6 Rebound Test

A rebound test was conducted from May 12, 2003 through February 23, 2004. The details for conducting this test are outlined in the Rebound Test Plan for Operable Unit/Groundwater System at the Miamisburg Closure Project (DOE 2003c) and the results are summarized in the Operable Unit 1 Groundwater Rebound Test (DOE 2005a). The test involved the collection and analysis of groundwater samples from wells within the OU-1 area. The samples were analyzed for VOCs and the results were compared to historical concentrations to assess the degree to which the groundwater system would show rebound of VOC concentrations. The rebound test was stopped in February because pre-determined VOC threshold concentrations were exceeded. The operation of the P&T and SVE system were resumed after the completion of the test.

The OU-1 area was divided into 6 flow zones: upgradient, interior, east edge, west edge, mid-section and downgradient. Initially, all wells were sampled on a weekly schedule. As the test progressed, changes were made to the sampling frequency; however, where concentrations were changing with time, the sampling frequency remained relatively high.

The concentrations in the upgradient, interior, and downgradient wells remained relatively stable throughout the rebound tests. The midsection, west edge, and east edge wells showed variable VOC concentrations throughout the test. The following is a summary of changes observed during the test period:

- The concentrations in the east edge wells were variable throughout the test period. Changes may be linked to changes in groundwater levels. Threshold values were not exceeded at anytime during the test.

- All midsection wells, with the exception of 0374, showed a long term increase in TCE concentrations. PCE concentrations remained relatively stable throughout the test. Threshold levels were not exceeded; however, the threshold level for TCE (10 µg/L) was closely approached in the last sampling event.

- Concentrations in the west edge wells showed the greatest changed throughout the test. West edge Well 0417 exceeded the TCE threshold twice during the rebound test. Samples collected in September 2003 and January 2004 showed TCE concentrations of 6 and 16 µg/L, respectively. Also, a TCE concentration

increase was noted at Well 0413 in the sampling period prior to the increase in Well 0417.

It was concluded from the rebound test that changes in the VOC concentrations may have been more closely linked to increases in the groundwater table than from classical rebound of concentrations over time. During the test period, high groundwater levels were measured and were due to exceptionally high river stages in July 2003. During this timeframe, increases in VOC concentrations were observed in the wells.

The decision to abort the rebound test and restart the remediation system was precipitated by the increase of TCE in Well 0417 in January. It was proposed to continue on with the rebound test to evaluate the changes in VOCs over time and to sample more frequently in downgradient wells to ensure there was no additional migration of VOCs or impact to the production wells. This proposal was rejected by the regulatory agencies.

6.7.2 Phase I Groundwater

Groundwater sampling in the Phase I area to support the MNA remedy was started in 2004. Samples are collected from 8 wells and 1 seep to monitor the attenuation of TCE in this area. Samples are also collected from 7 wells to confirm the conclusions regarding the presence of elevated barium, radium 226/228, nickel, and/or chromium in groundwater.

6.7.2.1 Early Data

During the remedial investigation program for the project, VOC contamination was identified in the Phase I area. Concentrations of TCE greater than the MCL of 5 mg/L were identified in Well 0411 and Seep 0617. Soil and groundwater data from the wells in the vicinity of Well 0411 suggest that the TCE contamination is most likely limited to the area adjacent to the well. There is no known continuing source of TCH contamination in the soil in Phase I. However, TCE is not naturally occurring and was widely used in plant operation.

Groundwater data collected for both routine monitoring and to support parcel transfer yielded unusual and unexpected results. Relatively high concentrations of radium and barium were observed in low-yielding bedrock wells that are located in two different areas of the Mound site. Neither of the subject areas is located in the central part of the site that involved production or materials handling. An investigation is in the Geochemical Evaluation of Elevated Ba and Ra in Bedrock at the Miamisburg Closure Project (DOE 2006a). The hypothesis from the investigation for the presence of the elevated parameters is that the brines in Wells 0335 and 0445 originate from dissolution of salt stored at the ground surface. The dense brine infiltrated into an area of the bedrock that is relatively isolated from the main groundwater from regime. Interactions of this brine with the bedrock released radium and barium to the groundwater.

Field investigations indicated elevated nickel and chromium concentrations occur in wells constructed of stainless steel. Fieldwork showed that elevated chromium and nickel in the wells was highly localized and not widespread. Crevice corrosion of the wire slotted stainless steel well casing was the suspected mechanism for releasing the chromium and nickel from the casing

to the groundwater adjacent to the well. This condition is more evident in samples collected using low-flow sampling techniques. The elevated levels observed in Wells 0319, 0399, 0400, and 0411 are the likely result of corrosion of the well casing and not the result of plant operations.

6.7.2.2 2004 Data

Results, interpretations, and conclusions from the 2004 sampling events are presented in the *Phase I Groundwater Monitoring Report* (January 2004 through November 2004) (DOE 2006b). The report summarizes the data collected in both time series plots and map view plots. The time series plots are utilized to determine data trend and to interpret the effectiveness of the MNA remedy.

Remedy Monitoring— Monitoring results show continued low-level TCE and cis-1,2-dichloroethylene (DCE) detections in bedrock monitoring Wells 0411 and 0443 as well as bedrock Seep 0617. All VOC concentrations remained below trigger levels during 2004. All wells screened in the downgradient EVA. groundwater system continue to show no detectable concentrations of VOCs.

Confirmatory Sampling - Barium and Radium— Monitoring results show elevated radium-226/ 228 and barium concentrations in monitoring Well 0445. Results for November were reported above the level of concern of 75 pCi/L. Radium and barium concentrations in the BVA wells (0400, 0402, and P033) remained low. The low levels of radium and barium detected in the BVA wells demonstrates that the BVA is not being adversely impacted by the upgradient bedrock water in the vicinity of Well 0445.

Confirmatory Sampling - Chromium and Nickel— Requirements for nickel and chromium monitoring were not finalized until September 2004; therefore, samples were not collected for the first three quarters of 2004. Monitoring results show very low concentrations of nickel and chromium in bedrock monitoring Well 0442, which is constructed from PVC. Bedrock monitoring Well 0443 demonstrated excessively high levels of chromium and nickel. This well was unable to support micropurge sampling during the November 2004 sampling event and was sampled using a bailer. Filtered and unfiltered samples were collected, as samples collected using a bailer are typically turbid. It is assumed the filtered sampled may more closely represent to dissolved metal load in this area when compared to previously collected data. The unfiltered samples likely represent metal sorbed onto to sediment surfaces. The chromium and nickel sample results for the remainder of the locations were below the 100 µg/L level of concern.

Summary— VOC data collected in support of the MNA remedy demonstrate that the BVA is not being impacted by the localized low-level TCE contamination in the bedrock groundwater system. There are no strong trends evident in the VOC data from Wells 0411 and 0443 and Seep 0617 during 2004.

No conclusions were drawn from the confirmatory sampling for barium, radium, chromium, and nickel. Sampling continued in 2005.

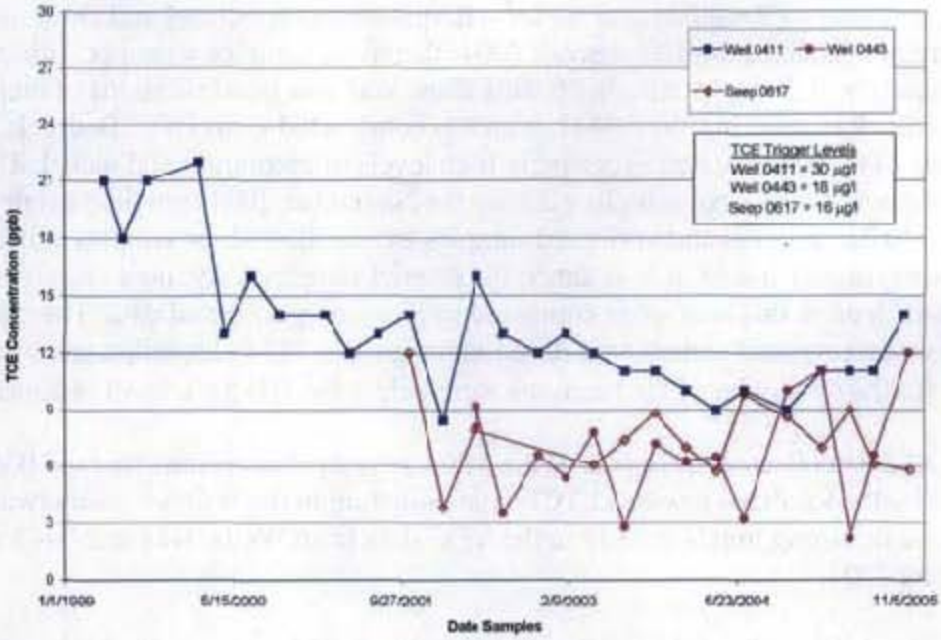


Figure 6-7. TCE Concentrations in Wells 0411 and 0443 and Seep 0617 in Phase I

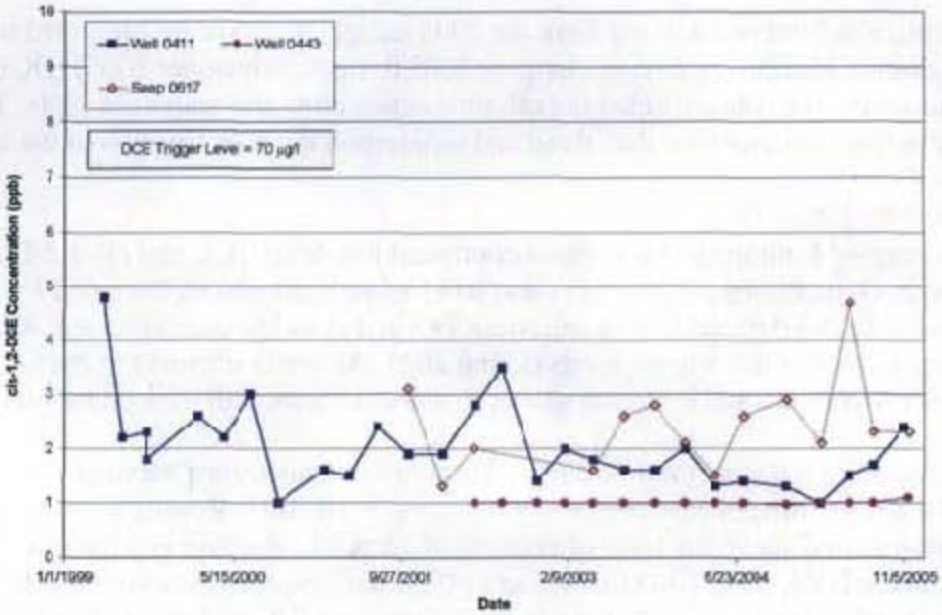


Figure 6-8. cis-1,2-DCE Concentrations in Wells 0411 and 0443 and Seep 0617 in Phase I

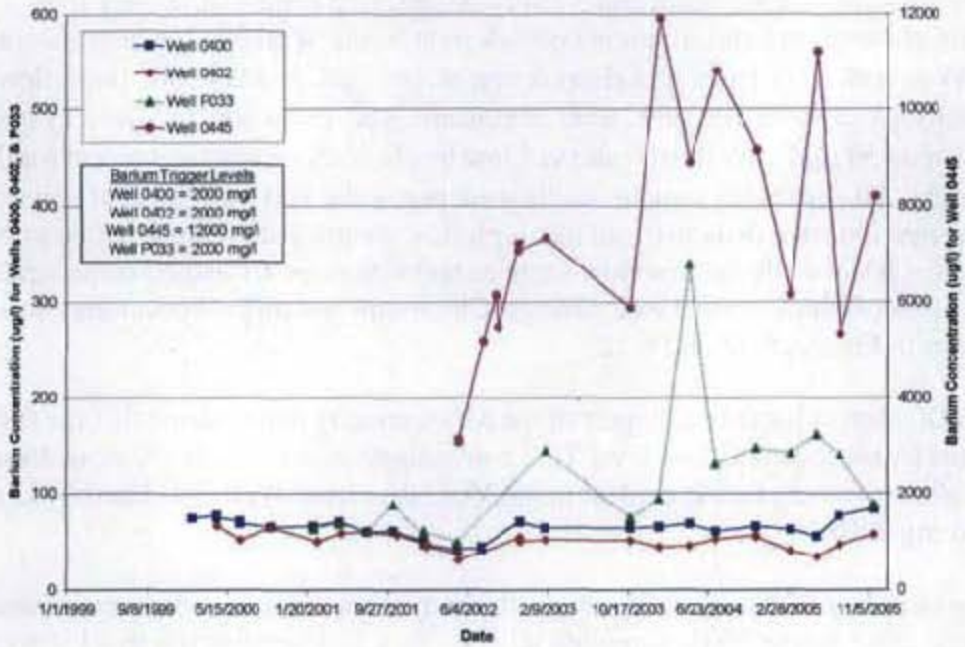


Figure 6-9. Barium Concentrations in Wells 0400, 0402, 0445, and P033 in Phase I

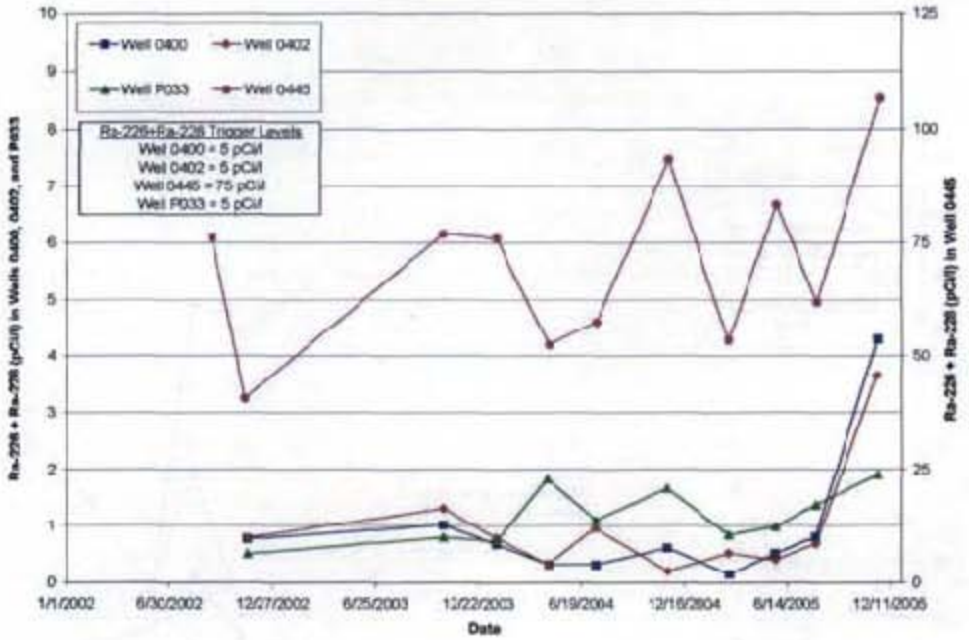


Figure 6-10. Combined Radium 226/228 Concentrations in Wells 0400, 0402, 0445, and P033 in Phase I

6.7.2.3 2005 Data

Results, interpretations, and conclusions from the 2005 sampling events are presented in the *Phase I Groundwater Monitoring Report* (January 2005 through November 2005) (DOE 2006c). The report summarizes the data collected in both time series plots and map view plots. The time series plots are utilized to determine data trend and to interpret the effectiveness of the MNA remedy.

Remedy Monitoring— Monitoring results show continued low-level TCE and cis-l, 2-DCE detections in bedrock monitoring Wells 0411 and 0443 as well as bedrock Seep 0617 (Figures 6-7 and 6-8). No detectable concentrations of vinyl chloride were reported. All VOC concentrations remained below trigger levels during 2005. All wells screened in the downgradient BVA groundwater system continue to show no detectable concentrations of VOCs.

Confirmatory Sampling - Barium and Radium— Monitoring results show elevated radium-226/ 228 and barium concentrations in monitoring Well 0445. Results for May and November were reported above the level of concern of 75 pCi/L. Radium and barium concentrations in the BVA wells (0400, 0402, and P033) remained low. Radium levels in Wells 0400 and 0402 increases slightly but are still below the MCL of 5 pCi/L. Barium and radium concentrations since 1999 are shown in Figures 6-9 and 6-10. Further monitoring is required to determine if the radium increase in these wells are a trend. The low levels of radium and barium detected in the BVA wells demonstrates that the BVA is not being adversely impacted by the upgradient bedrock water in the vicinity of Well 0445.

Confirmatory Sampling - Chromium and Nickel— Monitoring results show very low concentrations of nickel and chromium in bedrock monitoring Well 0442, which is constructed from PVC. BVA Well 0319 had a nickel excursion of 166 µg/L in May 2005 (high flow rate sample), which exceeded the 100 µg/L level of concern. This event was followed by two quarters of results less than 50 µg/L. Well 0400 showed low levels of chromium and nickel for the high flow rate sample. All chromium sample results were below the 100 µg/L level of concern. Previous investigation have demonstrated that high flow samples are representative of Ni and Cr concentrations in BVA while the low flow samples show elevated Cr and Ni concentrations as a result of corrosion of stainless steel well casings. Chromium and nickel concentrations since 2002 are shown in Figures 6-11 and 6-12.

Summary— VOC data collected in support of the MNA remedy demonstrate that the BVA is not being impacted by the localized low-level TCE contamination in the bedrock groundwater system. There are no strong trends evident in the VOC data from Wells 0411 and 0443 and Seep 0617 during 2005.

Confirmatory sampling for barium and radium showed and increase in radium concentrations at Wells 0400 and 0402 during 2005. Sampling will continue to determine if a trend is occurring at these locations.

Confirmatory monitoring for nickel and chromium showed one excursion above the level of concern for nickel. The single result for May was not duplicated during 2005. Monitoring will continue to determine if a trend is occurring at this location.

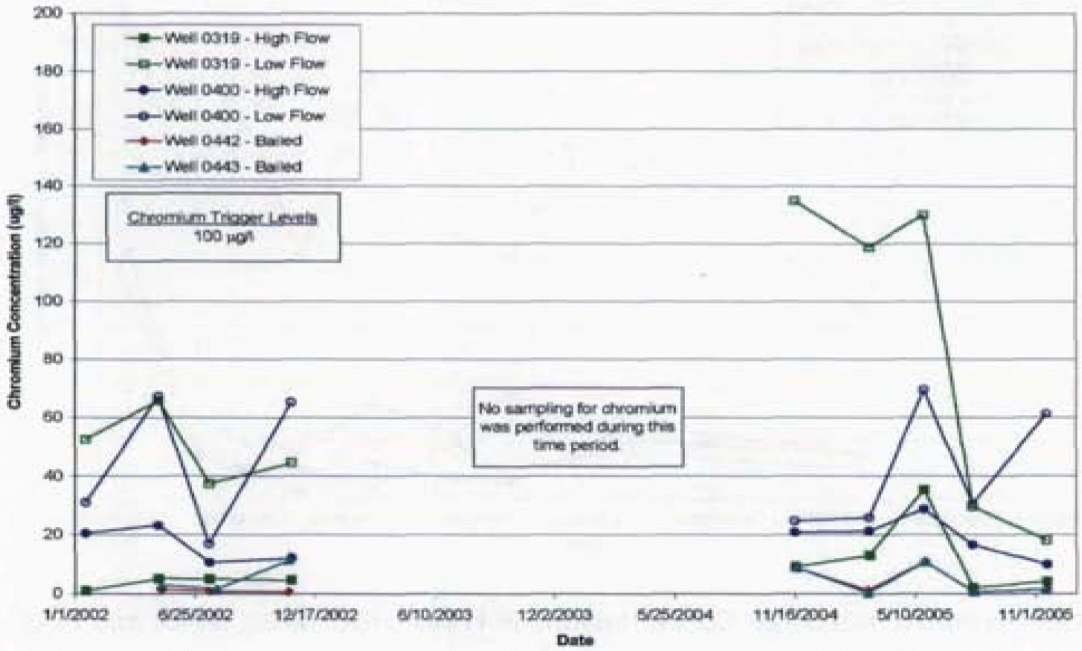


Figure 6-11. Chromium Concentrations in Wells 0319, 0400, 0442, and 0443 in Phase I

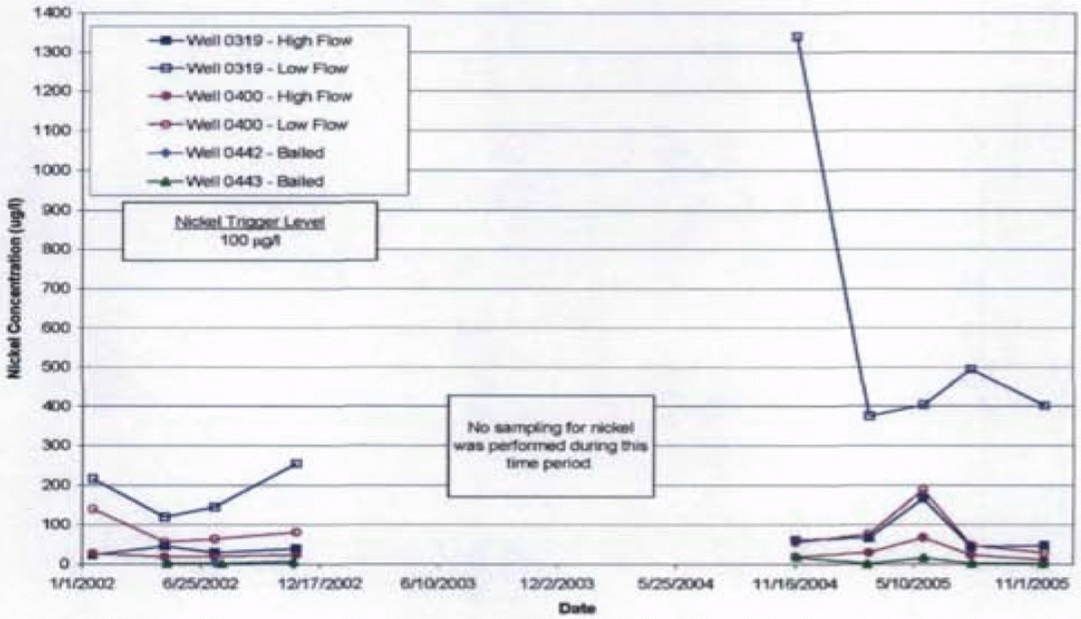


Figure 6-12. Nickel Concentrations in Wells 0319, 0400, 0442, and 0443 in Phase I

7.0 Technical Assessment

7.1 Institutional Controls

Question A: Is the remedy function as intended by the decision documents?

Answer A; Yes, the remedy if functioning as intended by the decision documents.

7.1.1 Remedial Action Performance

The review of documents and the results of the annual and Five-Year Review inspections indicate that the remedies for Parcels D, H, 3, and 4, which consist of ICs on land and groundwater use, is functioning as intended.

7.1.2 Operations and Maintenance

Operation and maintenance activities are performed as outlined in the *Operations and (Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property*. DOE has performed annual walk-overs and records reviews with respect to ICs and has found that portion of the remedy to be functioning as intended, thus far.

7.1.3 Opportunities for Optimization

The use of hand-held global positioning system (GPS) units has been recommended during previous annual inspections as discussed in Section 6.5. The GPS units could enhanced the inspections by assisting in locating certain important inspection points, such as features noted in previous inspections or aerial photographs or monitoring wells.

7.1.4 Early Indicators of Potential Issues

Recurring use of the retention basin in Parcel 4 indicates there is potential for violation of ICs (use inconsistent with industrial/commercial land-use).

Question B: Are the exposure assumption, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Answer: Yes, the exposure assumptions, toxicity data, clean-up levels, and remedial objectives used at the time of the remedy are still valid.

No changes in the risk parameters or ARARs were identified that would call into question the protectiveness of the remedies selected at the Mound site.

For the evaluation of risk, the Mound Plant production wells were used as the point where exposure to contaminated groundwater would occur. These wells were screened in the BVA. The Mound Plant production wells no longer exist. These wells were removed from service in October 2005 when the facility was placed on the city water supply. However, for future land use, the assumption of an on-site production well screening in the BVA, similar to the Mound Plant production wells is still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Answer C: No other information has come to light that could call into question the protectiveness of the remedy.

7.2 OU-1 Remedy

Question A: Is the remedy functioning as intended by the decision documents?

Answer A: Yes, the remedy is functioning as intended by the decision documents.

7.2.1 Remedial Action Performance

The review of documents and environmental monitoring data and the results of the Five-Year Review inspection indicate that the remedy for OU-1, which consists of controlling contaminant migration through the use of a pump and treatment system, is functioning as intended. Hydraulic and groundwater data indicate that the migration of the plume has been controlled by the use of the extraction wells. The performance monitoring indicates that VOC contamination is being extracted by the wells and treated to levels typically less than the detectable limit through the air stripper. Based on groundwater monitoring, potential receptors have not been exposed to VOC contamination from the landfill.

7.2.2 Operations and Maintenance

Operation and maintenance activities are performed as outlined in the *OU-1 Pump and Treatment Operational and Maintenance Plan*. DOE also performs annual inspections on long-term remedies as called out in this plan and other O&M Plans. DOE has performed groundwater monitoring, effluent monitoring and system monitoring and has found this remedy to be functioning as intended, thus far.

7.2.3 Implementation of Institutional Controls and other Measures

The results of the five-year inspection indicate that the fencing installed to prevent access to the landfill and the surface water controls are functioning adequately. ICs that restrict land use and groundwater use will be implemented at a later date as outlined in the Record of Decision.

7.2.4 Monitoring Activities

Groundwater level measurements and groundwater contaminant information have been collected as prescribed. These results from these data indicate that the plume has been contained and unacceptable migration has not occurred.

Influent and effluent data from the pump and treatment system indicate that VOC contaminated groundwater is being extracted and the mass removed over time has decreased. Effluent data supports that the air stripper system is effective in removing VOC contamination from the groundwater.

7.2.5 Opportunities for Optimization

A checksheet should be developed for a more regimented inspection of the OU-1 landfill area. To date, environmental restoration activities have been on-going at the Mound site and a full-time presence that can address events in the OU-1 area is available. In the future, limited resources at the Mound site will reduce the ability to identify potential issues.

7.2.6 Early Indicators of Potential Issues

There are no early indicators of potential issues that could affect the protectiveness of the remedy.

> ***Question B: Are the exposure assumption, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?***
>
> **Answer: Yes, the exposure assumptions, toxicity data, clean-up levels, and remedial objectives used at the time of the remedy are still valid.**

No changes in the risk parameters or ARARs were identified that would call into question the protectiveness of the remedies selected at the Mound site.

For the evaluation of risk, the Mound Plant production wells were used as the point where exposure to contaminated groundwater would occur. These wells were screened in the BVA. The Mound Plant production wells no longer exist. These wells were removed from service in October 2005 when the facility was placed on the city water supply. However, for future land use, the assumption of an on-site production well screening in the BVA, similar to the Mound Plant production wells is still valid.

Also, the influence of the removal of the production wells should be evaluated on the adequacy of the monitoring network in the vicinity of OU-1. The production wells artificially controlled the groundwater flow in the area. Now that these wells have been removed, the groundwater flow direction should be evaluated with respect to the compliance boundary and the assessment of off-site migration.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Answer C: No other information has come to light that could call into question the protectiveness of the remedy.

7.3 Phase I Groundwater (MNA) Remedy

Question A: Is the remedy function as intended by the decision documents?

Answer A: Yes, the remedy if functioning as intended by the decision documents.

7.3.1 Remedial Action Performance

The review of documents and environmental monitoring data and the results of the annual and Five-Year Review inspections indicate that the remedy for Phase I, which consists of MNA to address groundwater impact and ICs on land and groundwater use, is functioning as intended.

7.3.2 Operations and Maintenance

Operation and maintenance activities are performed as outlined in the *Operations and Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property* and the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. DOE has performed annual walkovers and records reviews with respect to ICs and has found that portion of the remedy to be functioning as intended, thus far. DOE has also performed groundwater monitoring and has found the groundwater remedy to be functioning as intended, thus far.

7.3.3 Implementation of Institutional Controls and other Measures

ICs have been implemented in the form of deed restrictions on future land use. A summary is prepared and included with the parcel deed that fulfills the requirements of CERCLA Section 120(h). The summary includes a discussion of the contamination that was present, the remedial actions that have taken place, and the residual risk that remains.

The current land owner has implemented several measures to ensure that ICs are not violated. These include including language into the technical requirements of all Requests for Proposal and Work Orders for work being performed on transferred parcels that excavated soil is not be removed from the site.

7.3.4 Monitoring Activities

Groundwater monitoring has been performed as prescribed in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. Results from this monitoring indicate that

concentrations do not exceed target levels. However, this remedy has not been implemented long and insufficient data is available to determine a trend in contaminant concentrations. Confirmatory sampling for radium, barium, chromium, and nickel are also inconclusive at this time.

7.3.5 Opportunities for Optimization

None have been identified based on this Five-Year Review.

7.3.6 Early Indicators of Potential Issues

There are no early indicators of potential issues that could affect the protectiveness of the remedy.

> ***Question B: Are the exposure assumption, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?***
>
> **Answer: Yes, the exposure assumptions, toxicity data, clean-up levels, and remedial objectives used at the time of the remedy are still valid.**

No changes in the risk parameters or ARARs were identified that would call into question the protectiveness of the remedies selected at the Mound site.

For the evaluation of risk, the Mound Plant production wells were used as the point where exposure to contaminated groundwater Would occur. These wells were screened in the BVA. The Mound Plant production wells no longer exist. These wells were removed from service in October 2005 when the facility was placed on the city water supply. However, for future land use, the assumption of an on-site production well screening in the BVA, similar to the Mound U| Plant production wells is still valid.

> ***Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***
>
> **Answer C: No other information has come to light that could call into question the protectiveness of the remedy.**

8.0 Issues

A summary of the issues identified during this Five-Year Review are compiled in Table 8-1. These issues were identified though either report review or walkovers and inspections. In general!, most are suggestions for best management practice. However, several could results in deficiencies that would make proving protectiveness of the remedy in the future difficult.

Table 8-1. Primary Issues Identified during the Five-Year Review

Issue		Affects Protectiveness (Y/N)	
		Current	**Future**
1	Ineffective signage at the Parcel 4 retention basin has resulted in violation of ICs in the past (land-use inconsistent with industrial/commercial land-use). (Sections 6.5.4 and 6.5.5)	N	Y
2	Permanent ID markers are not installed on all long-term groundwater monitoring wells. (Section 6.5 and photographs in Appendix B)	N	N
3	Protective casings of the long-term groundwater monitoring locations are in general disrepair. (Section 6.5 and photographs in Appendix B)	N	Y
4	Adequate protection from vehicular traffic is not present for long-term groundwater monitoring wells. (Section 6.5 and photographs in Appendix B)	N	N
5	Excessive vegetation is present around the long-term groundwater monitoring locations. (Section 6.5 and photographs in Appendix B)	N	N
6	Excessive vegetation is present around the OU-1 facility and structures and on the landfill surface. (Section 6.6.3 and photographs in Appendix B)	N	N
7	Inadequate stormwater control is maintained on the southwestern corner of the landfill. (Section 6.6.3 and photographs in Appendix B)	N	N
8	Inadequate documentation and interpretation of operational and monitoring data for the OU-1 remedy is maintained. (Section 6.4.1)	N	Y

9.0 Recommendations and Follow-Up Actions

9.1 Issue 1

1. *Ineffective signage at the Parcel 4 retention basin has resulted in violation of the ICs in the past (land-use inconsistent with industrial/commercial land-use).*

The present signage (Recreational Use Prohibited) around the retention basin in Parcel 4 does not adequately inform people who may frequent the area that the use of the basin for fishing is not allowed. The area has been landscaped and a hiking/biking path is located adjacent to the basin and lends to the perception that the basin can be used for recreational purposes. Signage that informs area visitors that fishing, as well as swimming and wading, is prohibited would be more straightforward. An alternative would be to post that there are no fish stocked in the basin and this may deter future use. By addressing this issue earlier rather than later will prevent an unacceptable exposure to the public as this retention basin collects water from other portions of the Mound Plant property, which have been remediated to an industrial use scenario, not a recreational use scenario.

This issue should be addressed by DOE, EPA, and OEPA in conjunction with the property owner, MMCIC. A reconciliation of this issue should be achieved prior to the next walkover inspection for the evaluation of ICs at the Mound site that is forecast for February of 2007.

9.2 Issues 2,3,4, and 5

2. *Permanent ID markers are not installed on all long-term groundwater monitoring wells.*
3. *Protective casings of the long-term groundwater monitoring locations are in general disrepair.*
4. *Adequate protection from vehicular traffic is not present for long-term groundwater monitoring wells.*
5. *Excessive vegetation is present around the long-term groundwater monitoring locations.*

A routine maintenance program needs to be established for the long-term groundwater monitoring locations at the Mound site. This program should include periodic inspections of the integrity of the wells and the condition of the protective casing and surface pad as well as the surrounding area and access. Neglect of these wells could lead to failure of the surface seals and lead to the potential for migration of contamination from surface sources into the subsurface. Also, protection of these locations should be maintained as construction activities increase in the transitioned parcels. In the long-term this could impact the monitoring results that are used to evaluate the effectiveness of the remedies.

This issue should be addressed by DOE. An inspection of the known long-term monitoring locations should be made and corrective action implemented to address the 4 issues. Corrective action should be implemented by April 30,2007.

9.3 Issue 6

6. Excessive vegetation is present around the OU-1 facility and structures and on the landfill surface.

A routine maintenance program to address vegetation and general housekeeping needs to be established for the OU-1 area. During the inspection, excessive vegetation was noted around the treatment buildings, extraction wells, SVE wells, fence line, and drainage areas. Routine cutting of the vegetation would facilitate periodic inspection of the facility and appurtenances, reduce degradation of the concrete drainage channels, facilitate flow in the drainage channels, and reduce the likelihood of vermin in the buildings.

This issue should be addressed by DOE. Corrective action should be implemented by October 31,2006.

9.4 Issue 7

8. Inadequate stormwater control is maintained on the southwestern corner of the landfill.

A corrective action should be developed to address the inadequate stormwater controls on the southwestern comer of the OU-1 landfill. Ponding of water should be prevented in order to reduce the infiltration of water into the landfill that will ultimately lead to migration of contaminants from the soil into the groundwater.

This issue should be addressed by DOE. A corrective action plan should be developed by December 31,2006 and implemented prior to the next walkover inspection for the evaluation of ICs at the Mound site that is forecast for February 2007.

9.5 Issue 8

9. Inadequate documentation and interpretation of operational and monitoring data for the OU-1 remedy is maintained.

An annual report summarizing the hydraulic gradient determinations, groundwater monitoring data, and performance evaluations of the OU-1 pump and treatment and SVE systems should be prepared. Previous reporting was accomplished using the monthly reports prepared by the environmental restoration contractor. While monthly summaries of the data are beneficial, an annual summary would aid in the interpretation of the performance of the system and provide valuable information for future Five-Year Reviews.

This issue should be addressed by DOE. An annual report summarizing the hydraulic gradient determinations, groundwater monitoring data, and performance evaluations of the OU-1 pump and treatment and SVE systems will be prepared for each calendar year. The first report will be prepared by May 31,2007.

10.0 Protectiveness Statements

10.1 Institutional Controls (including Phase I)

The remedy for Parcels D, H, 3, and 4 and ICs associated with Phase I are protective of human health and the environment because controls are functioning as intended. However, in order to ensure the long-term protectiveness of the remedy, adequate signage that informs visitors that fishing, as well as swimming and wading, is prohibited in the Parcel 4 retention basin should be installed.

10.2 Operable Unit 1

The remedy for Operable Unit 1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled through containment of the plume and control of access to the landfill. However, in order to ensure the long-term protectiveness of the remedy, adequate documentation and interpretation of the operational and monitoring data associated with the pump and treatment system should be maintained. Also, long-term monitoring locations should be adequately maintained to ensure that representative samples are obtained and to prevent possible impact to the aquifer via surface water infiltration.

10.3 Phase I Groundwater (MNA) Remedy

The remedy for Phase I is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through MNA. In the interim exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent the groundwater from being used in the restricted area. However, in order to ensure the long-term protectiveness of the remedy, long-term monitoring locations should be adequately maintained to ensure that representative samples are obtained and to prevent possible impact to the aquifer via surface water infiltration.

11.0 Next Review

This is the second statutory Five-Year Review for this site. The next Five-Year Review will be conducted in the year 2011.

12.0 References

U.S. Department Of Energy (DOE) 1995. *Record of Decision for Operable Unit*, Final June.

DOE 1997. Mound 2000 Residual Risk Evaluation Methodology, Final, January.

DOE 1999a. *Record of Decision for Release Block D*, Final, February.

DOE 1999b. *Record of Decision for Release Block H*, Final, June.

DOE 1999c. Work Plan for Environmental Restoration of the DOE Mound Site, the Mound 2000 Approach, Revision 0 - Final, February.

DOE 2000. *OU-1 Pump and Treatment Operation and Maintenance Plan*, March.

DOE 2001a. *CERCLA Five-Year Review Report for the Operable Unit 1 Remedy at the U.S. Department of Energy Miamisburg Environmental Management Project*, September.

DOE 2001b. *Parcel 3 Record of Decision*, Final, August.

DOE 2001c. *Parcel 4 Record of Decision*, Final, February.

DOE 2002. *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property*, Final, June.

DOE 2003a. *Phase I Record of Decision*, Final July.

DOE 2003b. *Operations and Maintenance Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property*, Rev. 0.

DOE 2003c. *Rebound Test Plan for Operable Unit 1 Groundwater System at the Miamisburg Closure Project*, Final, June.

DOE 2003d. *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property*, Final, June.

DOE 2004a. *Phase I Groundwater Monitoring Plan*, Final September.

DOE 2004b. *Miami-Erie Canal Record of Decision*, Final, September.

DOE 2004c. *Residual Risk Evaluation - OU-4 Miami-Erie Canal Area*, Final, May.

DOE 2004d. *Operable Unit 1 (OU-1) Technical Team Evaluation - Recommendations to the Mound Core Team*, Final, June.

DOE 2004e. *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property*, Final. July.

DOE 2005a. *Operable Unit 1 Groundwater Rebound Test*, April.

DOE 2005b. *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property*, Final, July.

DOE 2006a. *Data Report for the Field Investigation to Determine the Nature of Cr and Ni in Offsite Stainless Steel Wells Screened in the Buried Valley Aquifer*, Final, February.

DOE 2006b. *Phase I Groundwater Monitoring Report (January 2004 through November 2004)*, Draft Final, February.

DOE 2006c. *Phase I Groundwater Monitoring Report (January 2005 through November 2005)*, Final, May.

DOE 2006d. *Annual Assessment of the Effectiveness of Institutional Controls Applied to the Former Mound Site Property*, Final, June.

U.S. Environmental Protection Agency (EPA), 2001. *Comprehensive Five-Year Review Guidance*, OSWER 9355.7-03B-P, October.

Appendix A

Deeds for Parcels D, H, 3, and 4

Montgomery County
DEED-99-141458 0006
Jay Clark, Recorder
$18.00 12/21/99 07:59:27

Montgomery County
Judy Dodge Recorder
$130.00 11/22/02 11:28:45
DEED-02-19303 0006

DV 1.9

QUITCLAIM DEED

K46- 5-1-11

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic Energy Act of 1954, Section 161 (g) (42 U.S.C. §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a non-profit corporation subsisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUITCLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises), commonly known as Parcel D:

Situate in the State of Ohio, County of Montgomery, City of Miamisburg and being part of Section 30, Fractional Town 2, Range 5 Miami Rivers Survey (M.R.S.), and being part of City of Miamisburg Lot No. 2259 and being part of tract of land conveyed to the United States of America as described in deed book 1214, page 12-14 and, being more fully described in Exhibit A attached hereto and incorporated herein.

0623296 $.00

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and/or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right of access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

TRANSFERRED
99 DEC 20 AM 9:18
A.J. WAGNER
AUDITOR

DEED 99-0852 005

[illegible] being re-recorded to add [illegible]
(Exhibit B.)

3R049.5

38 Deed

Montgomery County
Jim Clark, Recorder
12/21/98 07:28:38

DN/2.9

QUITCLAIM DEED

H46-5-1-10

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic Energy Act of 1954, Section 161 (g) (42 U.S.C. §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a non-profit corporation schisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUITCLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises"), commonly known as Parcel H:

Situated in the State of Ohio, County of Montgomery, and in the City of Miamisburg, being part of Section 30, Range 5, Township 2, lying in the Miami Rivers Survey (M.R.S.), and containing 14.29 acres, more or less, and being more fully described in Exhibit A attached hereto and incorporated herein.

0022275 $.00

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and/or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right of access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

TRANSFERRED
DEC 29 1998
MARY L. WAGNER
AUDITOR
MONTGOMERY COUNTY, OHIO

This Deed and conveyance is made and accepted without warranty of any kind, either express or implied, except for the warranty in paragraph 3.3 of this Deed, and is expressly made and accepted subject to all reservations, restrictions, rights, covenants, easements, licenses, and permits, whether or not of public record, to the extent that the same affect the Premises.

1. The parties hereto intend the following restrictions and covenants to run with the land and to be binding upon the Grantee and its successors, transferees, and assigns or any other person acquiring an interest in the Premises, for the benefit of Grantor, USEPA and the State of Ohio, acting by and through the Director of OEPA or ODH, their successors and assigns.

DG29 99-0032 911

Note:
Deed is being re-recorded to add Exhibit B.

Deed
7/21/97

TRANSFER
02:17PM OCTOBER 17, 2002
KARL L. KEITH, COUNTY AUDITOR
Deed/Trsn #: 20466 1.00

43 P93
$178.

Div 110 K46-5-1-12
Div 113 K46-5-3-28

QUIT CLAIM DEED

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic energy Act of 1954, Section 161 (g) (42U.S.C. §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a non-profit corporation subsisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUIT CLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises), commonly known as Parcel 3:

Situated in the State of Ohio, County of Montgomery and being parts of City of Miamisburg Lot Number 2259 and 2290, also being part of Sections 30, Fractional Town 2, Range 5 East M.R.S. and Fractional Section 36, Fractional Town 2, Range 5 East M.R.S. and being a portion previously conveyed to USA as described in Deed Book 1246, Page 45 and also being a portion previously conveyed to USA as described in Deed Book 1214, Page 12 and also being a portion previously conveyed to USA as described in Deed Book 1256, Page 179 containing 4.805 acres, more or less, and being more fully described in Exhibit A attached hereto and incorporated herein.

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and, or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right of access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

This Deed and conveyance is made and accepted without warranty of any kind, either expressed or implied, except for the warranty in paragraph 3.3 of this Deed, and is expressly made under and subject to all reservations, restrictions, rights, covenants, easements, licenses, and permits, whether or not of public record, to the extent that the same affect the Premises.

1. The parties hereto intend the following restrictions and covenants to run with the land and to be binding upon the Grantee and its successors, transferees, and assigns or any other person acquiring an interest in the Premises, for the benefit of Grantor, USEPA and the State of Ohio, acting by and through the Director of OEPA or ODH, their successors and assigns.

Transmitted	
Examined	
Indexed	
Checked	
Delivered	
Verified	
Recorded	

$178.00 10/18/02 07:35:19
BEER-02-128206 0043
Montgomery County
Judy Dodge Recorder

D30460

DIV/TAX/2T1

KAL-15-7-21,22

KAL-11-9-7,8

TRANSFER OCTOBER 17, 2000
BOARD OF COUNTY AUDITOR
KAL. CO. KEITH
9.00

QUIT CLAIM DEED

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic Energy Act of 1954, Section 161 (g) (42 U.S.C §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a non-profit corporation subsisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUITCLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises), commonly known as Parcel 4:

Situated in the Southwest Quarter of Section 30, Town 2, Range 5, MRs, the Southeast Quarter of Section 36, Town 2 Range 5, MRs, Northeast Quarter Section 36, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01 of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, also being part of a 42.56 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-323A11 of the Deed Records of Montgomery County, Ohio, said 42.56 acre tract being comprised of a 46.313 acre tract known as Lot Numbered 4778 of the consecutive numbered lots of the City of Miamisburg, said 42.56 acre tract being all the remainder of an 80 acre tract as conveyed from Ray C. Dunaway and Thelma Mae Dunaway to Oak Knoll Development and Investment Co., Inc., as recorded in Microfiche No. 71-515B06 of the Deed Records of Montgomery County, Ohio; being a new division of 94.838 acres from said 79.74 acre and 42.55 acre tracts and being more fully described in Exhibit A attached hereto and incorporated herein.

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and/or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right to access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

Proofed	
Confirmed	
Filed	
Copied	
Entered	
Verified	

RECEIVED 1997 ... RED-02-12800. $40
Montgomery County
Judy Beaver Recorder

Appendix B

Site Inspection Checklist

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Mound Plant Site	**Date of inspection:** February 22, 2006
Location and Region: Miamisburg, OH (Region 5)	**EPA ID:** OH6890008984
Agency, office, or company leading the Five-Year Review: US Department of Energy	**Weather/temperature:** Sunny – 40's

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; □ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; □ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; □ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; □ Report attached _____

4. **Other interviews** (optional) □ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

[x] O&M manual	[x] Readily available	[x] Up to date	□ N/A
□ As-built drawings	□ Readily available	□ Up to date	[x] N/A
□ Maintenance logs	□ Readily available	□ Up to date	[x] N/A

Remarks_____

2. **Site-Specific Health and Safety Plan** □ Readily available □ Up to date [x] N/A
□ Contingency plan/emergency response plan □ Readily available □ Up to date [x] N/A
Remarks_____

3. **O&M and OSHA Training Records** □ Readily available □ Up to date [x] N/A
Remarks_____

4.	**Permits and Service Agreements**			
	□ Air discharge permit	□ Readily available	□ Up to date	[x] N/A
	□ Effluent discharge	□ Readily available	□ Up to date	[x] N/A
	□ Waste disposal, POTW	□ Readily available	□ Up to date	[x] N/A
	□ Other permits_____	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
5.	**Gas Generation Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
6.	**Settlement Monument Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
7.	**Groundwater Monitoring Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
8.	**Leachate Extraction Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
9.	**Discharge Compliance Records**			
	G Air	□ Readily available	□ Up to date	[x] N/A
	G Water (effluent)	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
10.	**Daily Access/Security Logs**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			

IV. O&M COSTS

1. **O&M Organization**

□ State in-house □ Contractor for State
□ PRP in-house □ Contractor for PRP
□ Federal Facility in-house □ Contractor for Federal Facility
□ Other_____

2. **O&M Cost Records**

□ Readily available □ Up to date
□ Funding mechanism/agreement in place
Original O&M cost estimate_____ □ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS [x] Applicable □ N/A

A. Fencing

1. **Fencing damaged** □ Location shown on site map □ Gates secured [x] N/A

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** □ Location shown on site map [x] N/A

Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self-reporting and walk-over surveys
Frequency Annual
Responsible party/agency US. Department of Energy
Contact Art Kleinrath (Name) Project Manager (Title) 2006 (Date) (937) 847-3250 (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☒ Yes ☐ No ☐ N/A
Other problems or suggestions: ☒ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Review of annual reports and results from Five-Year inspection indicates that ICs are functioning as intended

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks

2. **Land use changes on site** ☒ N/A

Remarks

3. **Land use changes off site** ☒ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent_____ Depth_____
Remarks_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

~~**B. Benches**~~ ~~⊟ Applicable~~ ~~⊟ N/A~~

~~(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)~~

~~1. **Flows Bypass Bench**~~ ~~⊟ Location shown on site map~~ ~~⊟ N/A or okay~~

~~Remarks~~ _____

~~2. **Bench Breached**~~ ~~⊟ Location shown on site map~~ ~~⊟ N/A or okay~~

~~Remarks~~ _____

~~3. **Bench Overtopped**~~ ~~⊟ Location shown on site map~~ ~~⊟ N/A or okay~~

~~Remarks~~ _____

~~**C. Letdown Channels**~~ ~~⊟ Applicable~~ ~~⊟ N/A~~

~~(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)~~

~~1. **Settlement**~~ ~~⊟ Location shown on site map~~ ~~⊟ No evidence of settlement~~

~~Areal extent~~ _____ ~~Depth~~ _____

~~Remarks~~ _____

~~2. **Material Degradation**~~ ~~⊟ Location shown on site map~~ ~~⊟ No evidence of degradation~~

~~Material type~~ _____ ~~Areal extent~~ _____

~~Remarks~~ _____

~~3. **Erosion**~~ ~~⊟ Location shown on site map~~ ~~⊟ No evidence of erosion~~

~~Areal extent~~ _____ ~~Depth~~ _____

~~Remarks~~ _____

4. ~~Undercutting~~ ☐ ~~Location shown on site map~~ ☐ ~~No evidence of undercutting~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

5. ~~Obstructions~~ ~~Type~~ _____ ☐ ~~No obstructions~~
☐ ~~Location shown on site map~~ ~~Areal extent~~ _____
~~Size~~ _____
~~Remarks~~ _____

6. ~~Excessive Vegetative Growth~~ ~~Type~~ _____
☐ ~~No evidence of excessive growth~~
☐ ~~Vegetation in channels does not obstruct flow~~
☐ ~~Location shown on site map~~ ~~Areal extent~~ _____
~~Remarks~~ _____

~~D. Cover Penetrations~~ ☐ ~~Applicable~~ ☐ ~~N/A~~

1. ~~Gas Vents~~ ☐ ~~Active~~ ☐ ~~Passive~~
☐ ~~Properly secured/locked~~ ☐ ~~Functioning~~ ☐ ~~Routinely sampled~~ ☐ ~~Good condition~~
☐ ~~Evidence of leakage at penetration~~ ☐ ~~Needs Maintenance~~
☐ ~~N/A~~
~~Remarks~~ _____

2. ~~Gas Monitoring Probes~~
☐ ~~Properly secured/locked~~ ☐ ~~Functioning~~ ☐ ~~Routinely sampled~~ ☐ ~~Good condition~~
☐ ~~Evidence of leakage at penetration~~ ☐ ~~Needs Maintenance~~ ☐ ~~N/A~~
~~Remarks~~ _____

3. ~~Monitoring Wells~~ ~~(within surface area of landfill)~~
☐ ~~Properly secured/locked~~ ☐ ~~Functioning~~ ☐ ~~Routinely sampled~~ ☐ ~~Good condition~~
☐ ~~Evidence of leakage at penetration~~ ☐ ~~Needs Maintenance~~ ☐ ~~N/A~~
~~Remarks~~ _____

4. ~~Leachate Extraction Wells~~
☐ ~~Properly secured/locked~~ ☐ ~~Functioning~~ ☐ ~~Routinely sampled~~ ☐ ~~Good condition~~
☐ ~~Evidence of leakage at penetration~~ ☐ ~~Needs Maintenance~~ ☐ ~~N/A~~
~~Remarks~~ _____

5. ~~Settlement Monuments~~ ☐ ~~Located~~ ☐ ~~Routinely surveyed~~ ☐ ~~N/A~~
~~Remarks~~ _____

~~**E. Gas Collection and Treatment**~~ ~~☐ Applicable~~ ~~☐ N/A~~

~~1.~~ ~~**Gas Treatment Facilities**~~
~~☐ Flaring~~ ~~☐ Thermal destruction~~ ~~☐ Collection for reuse~~
~~☐ Good condition~~ ~~☐ Needs Maintenance~~
~~Remarks~~ _____

~~2.~~ ~~**Gas Collection Wells, Manifolds and Piping**~~
~~☐ Good condition~~ ~~☐ Needs Maintenance~~
~~Remarks~~ _____

~~3.~~ ~~**Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)~~
~~☐ Good condition~~ ~~☐ Needs Maintenance~~ ~~☐ N/A~~
~~Remarks~~ _____

~~**F. Cover Drainage Layer**~~ ~~☐ Applicable~~ ~~☐ N/A~~

~~1.~~ ~~**Outlet Pipes Inspected**~~ ~~☐ Functioning~~ ~~☐ N/A~~
~~Remarks~~ _____

~~2.~~ ~~**Outlet Rock Inspected**~~ ~~☐ Functioning~~ ~~☐ N/A~~
~~Remarks~~ _____

~~**G. Detention/Sedimentation Ponds**~~ ~~☐ Applicable~~ ~~☐ N/A~~

~~1.~~ ~~**Siltation**~~ ~~Areal extent~~ _____ ~~Depth~~ _____ ~~☐ N/A~~
~~☐ Siltation not evident~~
~~Remarks~~ _____

~~2.~~ ~~**Erosion**~~ ~~Areal extent~~ _____ ~~Depth~~ _____
~~☐ Erosion not evident~~
~~Remarks~~ _____

~~3.~~ ~~**Outlet Works**~~ ~~☐ Functioning~~ ~~☐ N/A~~
~~Remarks~~ _____

~~4.~~ ~~**Dam**~~ ~~☐ Functioning~~ ~~☐ N/A~~
~~Remarks~~ _____

~~**H. Retaining Walls** ☐ Applicable ☐ N/A~~

~~1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident~~
~~Horizontal displacement_____ Vertical displacement_____~~
~~Rotational displacement_____~~
~~Remarks_____~~

~~2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident~~
~~Remarks_____~~

~~**I. Perimeter Ditches/Off-Site Discharge** ☐ Applicable ☐ N/A~~

~~1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident~~
~~Areal extent_____ Depth_____~~
~~Remarks_____~~

~~2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A~~
~~☐ Vegetation does not impede flow~~
~~Areal extent_____ Type_____~~
~~Remarks_____~~

~~3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident~~
~~Areal extent_____ Depth_____~~
~~Remarks_____~~

~~4. **Discharge Structure** ☐ Functioning ☐ N/A~~
~~Remarks_____~~

~~**VIII. VERTICAL BARRIER WALLS** ☐ Applicable ☐ N/A~~

~~1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident~~
~~Areal extent_____ Depth_____~~
~~Remarks_____~~

~~2. **Performance Monitoring** Type of monitoring_____~~
~~☐ Performance not monitored~~
~~Frequency_____ ☐ Evidence of breaching~~
~~Head differential_____~~
~~Remarks_____~~

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (e.g., chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition G Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition G Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition G Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance [x] N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Institutional controls have been implemented in the form of deed restrictions on future land use. A summary is prepared and included with the parcel deed that fulfills the requirements of CERCLA Section 120(h). The summary includes a discussion of the contamination that was present, the remedial actions that have taken place, and the residual risk that remains.

The current land owner has implemented several measures to ensure that ICs are not violated. These include including language into the technical requirements of all Requests for Proposal and Work Orders for work being performed on transferred parcels that excavated soil is not be removed from the site.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Operation and maintenance activities are performed as outlined in the *Operations and Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property*. DOE has performed annual walk-overs and records reviews with respect to ICs and has found that portion of the remedy to be functioning as intended, thus far.

Future inspections will be performed as outlined in the O&M Plan, which will be modified (if necessary) when the RODs for additional parcels are completed.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. Recurring use of the retention basin in Parcel 4 for fishing indicates there is potential for violation of ICs (use inconsistent with industrial/commercial land-use). Present signage does not appear to be adequate. Future structures and areas such as ponds/basins needs to be better evaluated with respect to attractiveness for inappropriate use. No issues regarding cost or scope have been identified.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The use of hand-held GPS units has been recommended during previous annual inspections as discussed in Section 6.5. The GPS units could enhanced the inspections by assisting in locating certain important inspection points, such as features noted in previous inspections or aerial photographs or monitoring wells.

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Mound Plant Site	**Date of inspection:** July 13, 2006
Location and Region: Miamisburg, OH (Region 5)	**EPA ID:** OH6890008984
Agency, office, or company leading the Five-Year Review: US Department of Energy	**Weather/temperature:** Sunny – 80's

Remedy Includes: (Check all that apply)

- [x] Landfill cover/containment
- [x] Access controls
- [x] Institutional controls
- [x] Groundwater pump and treatment
- [x] Surface water collection and treatment
- [x] Other SVE system
- □ Monitored natural attenuation
- [x] Groundwater containment
- □ Vertical barrier walls

Attachments: [x] Inspection team roster attached [x] Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _____
   Problems, suggestions; □ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _____
   Problems, suggestions; □ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

4. **Other interviews** (optional) □ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

[x] O&M manual	[x] Readily available	[x] Up to date	□ N/A
□ As-built drawings	□ Readily available	□ Up to date	□ N/A
[x] Maintenance logs	[x] Readily available	[x] Up to date	□ N/A

Remarks Operational data difficult to gather

2. **Site-Specific Health and Safety Plan** [x] Readily available [x] Up to date □ N/A
□ Contingency plan/emergency response plan [x] Readily available [x] Up to date □ N/A
Remarks_____

3. **O&M and OSHA Training Records** [x] Readily available [x] Up to date □ N/A
Remarks Subcontractor complies with all necessary OSHA standards in accordance with O&M contract.

4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☒ Effluent discharge	☐ Readily available	☐ Up to date	☐ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits_____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks Effluent monitored under CERCLA ATD under NPDES (Authorization Number 1IN90010*BD)			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks			
7.	**Groundwater Monitoring Records**	☐ Readily available	☐ Up to date	☐ N/A
	Remarks Operational data difficult to gather			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☐ N/A
	☒ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A
	Remarks Data reported in monthly DMR reports to OEPA			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**
   - ☐ State in-house
   - ☐ PRP in-house
   - ☐ Federal Facility in-house
   - ☐ Contractor for State
   - ☐ Contractor for PRP
   - ☐ Contractor for Federal Facility
   - ☐ Other_____

2. **O&M Cost Records**
   - ☐ Readily available ☐ Up to date
   - ☐ Funding mechanism/agreement in place

   Original O&M cost estimate_____ ☐ Breakdown attached

   Total annual cost by year for review period if available

   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ ☐ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☒ N/A
   Remarks Temporary fence used to limit access and demarcate landfill boundary.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
   Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self-reporting, drive by
Frequency Weekly
Responsible party/agency S.M. Stoller
Contact Robert Ransbottom (Name) Proj. Eng. (Title) 2006 (Date) (937) 847-8350 (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A
Violations have been reported ☒ Yes ☐ No ☐ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks

3. **Land use changes off site** ☒ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A
Remarks

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS □ Applicable □ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map [x] Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Cracks** □ Location shown on site map [x] Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____

3. **Erosion** □ Location shown on site map [x] Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Holes** □ Location shown on site map [x] Holes not evident
Areal extent_____ Depth_____
Remarks_____

5. **Vegetative Cover** [x] Grass [x] Cover properly established [x] No signs of stress
[x] Trees/Shrubs (indicate size and locations on a diagram)
Remarks Some woody vegetation observed. Noted in photos from walk-over. Not noted on a diagram

6. **Alternative Cover (armored rock, concrete, etc.)** [x] N/A
Remarks_____

7. **Bulges** □ Location shown on site map [x] Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** [x] Wet areas/water damage not evident
□ Wet areas □ Location shown on site map Areal extent_____
□ Ponding □ Location shown on site map Areal extent_____
□ Seeps □ Location shown on site map Areal extent_____
□ Soft subgrade □ Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** □ Slides □ Location shown on site map [x] No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

~~1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~

~~2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~

~~3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~

C. Letdown Channels ☒ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☒ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☒ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☒ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** □ Location shown on site map [x] No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ v No obstructions
□ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
[x] No evidence of excessive growth
[x] Vegetation in channels does not obstruct flow
□ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations □ Applicable [x] N/A

~~1. **Gas Vents** □ Active □ Passive~~
~~□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition~~
~~□ Evidence of leakage at penetration □ Needs Maintenance~~
~~□ N/A~~
~~Remarks~~_____

~~2. **Gas Monitoring Probes**~~
~~□ Properly secured/locked G Functioning □ Routinely sampled □ Good condition~~
~~□ Evidence of leakage at penetration □ Needs Maintenance □ N/A~~
~~Remarks~~_____

~~3. **Monitoring Wells** (within surface area of landfill)~~
~~□ Properly secured/locked G Functioning □ Routinely sampled □ Good condition~~
~~□ Evidence of leakage at penetration □ Needs Maintenance □ N/A~~
~~Remarks~~_____

~~4. **Leachate Extraction Wells**~~
~~□ Properly secured/locked G Functioning □ Routinely sampled □ Good condition~~
~~□ Evidence of leakage at penetration □ Needs Maintenance □ N/A~~
~~Remarks~~_____

~~5. **Settlement Monuments** □ Located □ Routinely surveyed □ N/A~~
~~Remarks~~_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

~~1. **Gas Treatment Facilities**~~
~~☐ Flaring ☐ Thermal destruction ☐ Collection for reuse~~
~~☐ Good condition ☐ Needs Maintenance~~
~~Remarks~~ _____

~~2. **Gas Collection Wells, Manifolds and Piping**~~
~~☐ Good condition ☐ Needs Maintenance~~
~~Remarks~~ _____

~~3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)~~
~~☐ Good condition ☐ Needs Maintenance ☐ N/A~~
~~Remarks~~ _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

~~1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A~~
~~Remarks~~ _____

~~2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A~~
~~Remarks~~ _____

G. Detention/Sedimentation Ponds ☒ Applicable ☐ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☒ Siltation not evident
Remarks _____

2. **Erosion** Areal extent _____ Depth _____
☒ Erosion not evident
Remarks _____

3. **Outlet Works** ☒ Functioning ☐ N/A
Remarks _____

4. **Dam** ☐ Functioning ☒ N/A
Remarks _____

H. Retaining Walls □ Applicable [x] N/A

~~1. **Deformations** □ Location shown on site map □ Deformation not evident~~
~~Horizontal displacement_____ Vertical displacement_____~~
~~Rotational displacement_____~~
~~Remarks_____~~

~~2. **Degradation** □ Location shown on site map □ Degradation not evident~~
~~Remarks_____~~

I. Perimeter Ditches/Off-Site Discharge [x] Applicable □ N/A

1. **Siltation** □ Location shown on site map [x] Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. **Vegetative Growth** □ Location shown on site map □ N/A
[x] Vegetation does not impede flow
Areal extent_____ Type_____
Remarks Future housekeeping needs to address vegetation in perimeter ditches as it may impede flow in the future.

3. **Erosion** □ Location shown on site map [x] Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** □ Functioning □ N/A
Remarks Discharge of surface water along the southwestern corner fo the landfill does not occur due to previous construction activities in the area.

VIII. VERTICAL BARRIER WALLS □ Applicable [x] N/A

~~1. **Settlement** □ Location shown on site map □ Settlement not evident~~
~~Areal extent_____ Depth_____~~
~~Remarks_____~~

~~2. **Performance Monitoring** Type of monitoring_____~~
~~□ Performance not monitored~~
~~Frequency_____ □ Evidence of breaching~~
~~Head differential_____~~
~~Remarks_____~~

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☒ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent) Drewsperse
   ☒ Others SVE system
   ☒ Good condition ☐ Needs Maintenance
   ☒ Sampling ports properly marked and functional
   ☒ Sampling/maintenance log displayed and up to date
   ☒ Equipment properly identified
   ☒ Quantity of groundwater (gallons) treated annually 2002-34222381; 2003-246051697; 2004-30023665; 2005-40479339; 2006(June)-23677692
   ☐ Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☒ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
   ☒ Chemicals and equipment properly stored
   Remarks General housekeeping needs to be improved.

6. **Monitoring Wells** (pump and treatment remedy)
   ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☐ Good condition
   ☒ All required wells located ☒ Needs Maintenance ☐ N/A
   Remarks Wells need general maintenance, such as painting and labeling. Some vegetation control also required. Protection from vehicular traffic (bollards) needs to be evaluated.

D. Monitoring Data

1. Monitoring Data
   ☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
   ☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   □ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
   □ All required wells located □ Needs Maintenance [x] N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The review of documents and environmental monitoring data and the results of the Five-Year Review inspection indicate that the remedy for the OU-1, which consists of controlling contaminant migration through the use of a pump and treatment system, is functioning as intended. Hydraulic and groundwater data indicate that the migration of the plume has been controlled by the use of the extraction wells. The performance monitoring indicates that VOC contamination is being extracted by the wells and treated to levels typically less than the detectable limit through the air stripper. Based on groundwater monitoring, potential receptors have not been exposed to VOC contamination from the landfill.

Groundwater level measurements and groundwater contaminant information have been collected as prescribed. These results from these data indicate that the plume has been contained and unacceptable migration has not occurred.

Influent and effluent data from the pump and treatment system indicate that VOC contaminated groundwater is being extracted and the mass removed over time has decreased. Effluent data supports that the air stripper system is effective in removing VOC contamination from the groundwater.

The results of the five-year inspection indicate that the fencing installed to prevent access to the landfill and the surface water controls are functioning adequately. Institutional controls that restrict land use and groundwater use will be implemented at a later date as outlined in the Record of Decision.

B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Operation and maintenance activities are performed as outlined in the *OU-1 Pump and Treatment Operational and Maintenance Plan*. The DOE also performs annual inspections on long-term remedies as called out in this plan and other O&M Plans. DOE has performed groundwater monitoring, effluent monitoring and system monitoring and has found this remedy to be functioning as intended, thus far.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. There are no early indicators of potential issues that could affect the protectiveness of the remedy.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. A checksheet should be developed for a more regimented inspection of the OU-1 landfill area. To date, environmental restoration activities have been on-going at the Mound site and a full-time presence that can address events in the OU-1 area is available. In the future, limited resources at the Mound site will reduce the ability to identify potential issues.

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Mound Plant Site	**Date of inspection:** February 22, 2006
Location and Region: Miamisburg, OH (Region 5)	**EPA ID:** OH6890008984
Agency, office, or company leading the Five-Year Review: US Department of Energy	**Weather/temperature:** Sunny – 40's

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- [x] Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- [x] Other ICs handled under Site Inspection Checklist for ICs.
- [x] Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: [x] Inspection team roster attached [x] Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions: ☐ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions: ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; G Report attached _____
_____

4. **Other interviews** (optional) □ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

[x] O&M manual	[x] Readily available	[x] Up to date	□ N/A
□ As-built drawings	□ Readily available	□ Up to date	[x] N/A
□ Maintenance logs	□ Readily available	□ Up to date	[x] N/A

Remarks_____
_____

2. **Site-Specific Health and Safety Plan** □ Readily available □ Up to date [x] N/A
□ Contingency plan/emergency response plan □ Readily available □ Up to date [x] N/A
Remarks_____
_____

3. **O&M and OSHA Training Records** □ Readily available □ Up to date [x] N/A
Remarks_____
_____

4.	**Permits and Service Agreements**			
	□ Air discharge permit	□ Readily available	□ Up to date	[x] N/A
	□ Effluent discharge	□ Readily available	□ Up to date	[x] N/A
	□ Waste disposal, POTW	□ Readily available	□ Up to date	[x] N/A
	□ Other permits_____	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
5.	**Gas Generation Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
6.	**Settlement Monument Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
7.	**Groundwater Monitoring Records**	[x] Readily available	[x] Up to date	□ N/A
	Remarks Two annual reports and did in electronic database.			
8.	**Leachate Extraction Records**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
9.	**Discharge Compliance Records**			
	□ Air	□ Readily available	□ Up to date	[x] N/A
	□ Water (effluent)	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			
10.	**Daily Access/Security Logs**	□ Readily available	□ Up to date	[x] N/A
	Remarks_____			

IV. O&M COSTS

1. **O&M Organization**

□ State in-house □ Contractor for State
□ PRP in-house □ Contractor for PRP
□ Federal Facility in-house □ Contractor for Federal Facility
□ Other_____

2. **O&M Cost Records**

□ Readily available □ Up to date
□ Funding mechanism/agreement in place
Original O&M cost estimate_____ □ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost
From_____ To_____ _____ □ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable □ N/A

Refer to the Site Inspection Checksheet for ICs

~~**A. Fencing**~~

~~1. **Fencing damaged** □ Location shown on site map □ Gates secured □ N/A~~
~~Remarks~~_____

~~**B. Other Access Restrictions**~~

~~1. **Signs and other security measures** □ Location shown on site map □ N/A~~
~~Remarks~~_____

~~**C. Institutional Controls (ICs)**~~

~~1. **Implementation and enforcement**~~

~~Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☐ N/A~~
~~Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A~~

~~Type of monitoring (e.g., self reporting, drive by) _____~~
~~Frequency _____~~
~~Responsible party/agency _____~~
~~Contact _____~~
~~Name Title Date Phone no.~~

~~Reporting is up to date ☐ Yes ☐ No ☐ N/A~~
~~Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A~~

~~Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☐ N/A~~
~~Violations have been reported ☐ Yes ☐ No ☐ N/A~~
~~Other problems or suggestions: ☐ Report attached~~

~~2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☐ N/A~~
~~Remarks _____~~

~~**D. General**~~

~~1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident~~
~~Remarks _____~~

~~2. **Land use changes on site** ☐ N/A~~
~~Remarks _____~~

~~3. **Land use changes off site** ☐ N/A~~
~~Remarks _____~~

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

~~1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A~~
~~Remarks _____~~

~~**B. Other Site Conditions**~~

~~Remarks~~ _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

~~**A. Landfill Surface**~~

~~1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident~~
~~Lengths~~ _____ ~~Widths~~ _____ ~~Depths~~ _____
~~Remarks~~ _____

~~3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~4. **Holes** ☐ Location shown on site map ☐ Holes not evident~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress~~
~~☐ Trees/Shrubs (indicate size and locations on a diagram)~~
~~Remarks~~ _____

~~6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A~~
~~Remarks~~ _____

~~7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident~~
~~Areal extent~~ _____ ~~Height~~ _____
~~Remarks~~ _____

~~8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident~~
~~☐ Wet areas ☐ Location shown on site map Areal extent~~ _____
~~☐ Ponding ☐ Location shown on site map Areal extent~~ _____
~~☐ Seeps ☐ Location shown on site map Areal extent~~ _____
~~☐ Soft subgrade ☐ Location shown on site map Areal extent~~ _____
~~Remarks~~ _____

~~9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability~~
~~Areal extent~~ _____
~~Remarks~~ _____

~~**B. Benches**~~ ~~☐ Applicable~~ ~~☐ N/A~~
~~(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)~~

~~1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~ _____

~~2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~ _____

~~3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay~~
~~Remarks~~ _____

~~**C. Letdown Channels**~~ ~~☐ Applicable~~ ~~☐ N/A~~
~~(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)~~

~~1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation~~
~~Material type~~ _____ ~~Areal extent~~ _____
~~Remarks~~ _____

~~3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~4. Undercutting~~ ~~☐ Location shown on site map~~ ~~☐ No evidence of undercutting~~
~~Areal extent~~ _____ ~~Depth~~ _____
~~Remarks~~ _____

~~5. Obstructions~~ ~~Type~~ _____ ~~☐ No obstructions~~
~~☐ Location shown on site map~~ ~~Areal extent~~ _____
~~Size~~ _____
~~Remarks~~ _____

~~6. Excessive Vegetative Growth~~ ~~Type~~ _____
~~☐ No evidence of excessive growth~~
~~☐ Vegetation in channels does not obstruct flow~~
~~☐ Location shown on site map~~ ~~Areal extent~~ _____
~~Remarks~~ _____

~~D. Cover Penetrations~~ ~~☐ Applicable~~ ~~☐ N/A~~

~~1. Gas Vents~~ ~~☐ Active~~ ~~☐ Passive~~
~~☐ Properly secured/locked~~ ~~☐ Functioning~~ ~~☐ Routinely sampled~~ ~~☐ Good condition~~
~~☐ Evidence of leakage at penetration~~ ~~☐ Needs Maintenance~~
~~☐ N/A~~
~~Remarks~~ _____

~~2. Gas Monitoring Probes~~
~~☐ Properly secured/locked G Functioning~~ ~~☐ Routinely sampled~~ ~~☐ Good condition~~
~~☐ Evidence of leakage at penetration~~ ~~☐ Needs Maintenance~~ ~~☐ N/A~~
~~Remarks~~ _____

~~3. Monitoring Wells (within surface area of landfill)~~
~~☐ Properly secured/locked G Functioning~~ ~~☐ Routinely sampled~~ ~~☐ Good condition~~
~~☐ Evidence of leakage at penetration~~ ~~☐ Needs Maintenance~~ ~~☐ N/A~~
~~Remarks~~ _____

~~4. Leachate Extraction Wells~~
~~☐ Properly secured/locked G Functioning~~ ~~☐ Routinely sampled~~ ~~☐ Good condition~~
~~☐ Evidence of leakage at penetration~~ ~~☐ Needs Maintenance~~ ~~☐ N/A~~
~~Remarks~~ _____

~~5. Settlement Monuments~~ ~~☐ Located~~ ~~☐ Routinely surveyed~~ ~~☐ N/A~~
~~Remarks~~ _____

~~**E. Gas Collection and Treatment**~~ ~~⊟ Applicable~~ ~~⊟ N/A~~
~~1.~~ ~~**Gas Treatment Facilities**~~ ~~⊟ Flaring~~ ~~⊟ Thermal destruction~~ ~~⊟ Collection for reuse~~ ~~⊟ Good condition~~ ~~⊟ Needs Maintenance~~ ~~Remarks~~
~~2.~~ ~~**Gas Collection Wells, Manifolds and Piping**~~ ~~⊟ Good condition~~ ~~⊟ Needs Maintenance~~ ~~Remarks~~
~~3.~~ ~~**Gas Monitoring Facilities**~~ ~~(*e.g.*, gas monitoring of adjacent homes or buildings)~~ ~~⊟ Good condition~~ ~~⊟ Needs Maintenance~~ ~~⊟ N/A~~ ~~Remarks~~
~~**F. Cover Drainage Layer**~~ ~~⊟ Applicable~~ ~~⊟ N/A~~
~~1.~~ ~~**Outlet Pipes Inspected**~~ ~~⊟ Functioning~~ ~~⊟ N/A~~ ~~Remarks~~
~~2.~~ ~~**Outlet Rock Inspected**~~ ~~⊟ Functioning~~ ~~⊟ N/A~~ ~~Remarks~~
~~**G. Detention/Sedimentation Ponds**~~ ~~⊟ Applicable~~ ~~⊟ N/A~~
~~1.~~ ~~**Siltation**~~ ~~Areal extent~~ ~~Depth~~ ~~⊟ N/A~~ ~~⊟ Siltation not evident~~ ~~Remarks~~
~~2.~~ ~~**Erosion**~~ ~~Areal extent~~ ~~Depth~~ ~~⊟ Erosion not evident~~ ~~Remarks~~
~~3.~~ ~~**Outlet Works**~~ ~~⊟ Functioning~~ ~~⊟ N/A~~ ~~Remarks~~
~~4.~~ ~~**Dam**~~ ~~⊟ Functioning~~ ~~⊟ N/A~~ ~~Remarks~~

~~**H. Retaining Walls**~~ ~~□ Applicable~~ ~~□ N/A~~

~~1. **Deformations**~~ ~~□ Location shown on site map~~ ~~□ Deformation not evident~~
~~Horizontal displacement~~ ~~Vertical displacement~~
~~Rotational displacement~~
~~Remarks~~

~~2. **Degradation**~~ ~~□ Location shown on site map~~ ~~□ Degradation not evident~~
~~Remarks~~

~~**I. Perimeter Ditches/Off-Site Discharge**~~ ~~□ Applicable~~ ~~□ N/A~~

~~1. **Siltation**~~ ~~□ Location shown on site map~~ ~~□ Siltation not evident~~
~~Areal extent~~ ~~Depth~~
~~Remarks~~

~~2. **Vegetative Growth**~~ ~~□ Location shown on site map~~ ~~□ N/A~~
~~□ Vegetation does not impede flow~~
~~Areal extent~~ ~~Type~~
~~Remarks~~

~~3. **Erosion**~~ ~~□ Location shown on site map~~ ~~□ Erosion not evident~~
~~Areal extent~~ ~~Depth~~
~~Remarks~~

~~4. **Discharge Structure**~~ ~~□ Functioning~~ ~~□ N/A~~
~~Remarks~~

VIII. VERTICAL BARRIER WALLS □ Applicable [x] N/A

~~1. **Settlement**~~ ~~□ Location shown on site map~~ ~~□ Settlement not evident~~
~~Areal extent~~ ~~Depth~~
~~Remarks~~

~~2. **Performance Monitoring** Type of monitoring~~
~~□ Performance not monitored~~
~~Frequency~~ ~~□ Evidence of breaching~~
~~Head differential~~
~~Remarks~~

~~**C. Treatment System**~~	~~☐ Applicable ☐ N/A~~
~~1.~~	~~**Treatment Train** (Check components that apply)~~ ~~☐ Metals removal ☐ Oil/water separation ☐ Bioremediation~~ ~~☐ Air stripping ☐ Carbon adsorbers~~ ~~☐ Filters~~ ~~☐ Additive (*e.g.*, chelation agent, flocculent)~~ ~~☐ Others~~ ~~☐ Good condition ☐ Needs Maintenance~~ ~~☐ Sampling ports properly marked and functional~~ ~~☐ Sampling/maintenance log displayed and up to date~~ ~~☐ Equipment properly identified~~ ~~☐ Quantity of groundwater treated annually~~ ~~☐ Quantity of surface water treated annually~~ ~~Remarks~~
~~2.~~	~~**Electrical Enclosures and Panels** (properly rated and functional)~~ ~~☐ N/A ☐ Good condition G Needs Maintenance~~ ~~Remarks~~
~~3.~~	~~**Tanks, Vaults, Storage Vessels**~~ ~~☐ N/A ☐ Good condition G Proper secondary containment ☐ Needs Maintenance~~ ~~Remarks~~
~~4.~~	~~**Discharge Structure and Appurtenances**~~ ~~☐ N/A ☐ Good condition G Needs Maintenance~~ ~~Remarks~~
~~5.~~	~~**Treatment Building(s)**~~ ~~☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair~~ ~~☐ Chemicals and equipment properly stored~~ ~~Remarks~~
~~6.~~	~~**Monitoring Wells** (pump and treatment remedy)~~ ~~☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition~~ ~~☐ All required wells located ☐ Needs Maintenance ☐ N/A~~ ~~Remarks~~
D. Monitoring Data	
1.	Monitoring Data ☒ Is routinely submitted on time ☒ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

[x] Properly secured/locked [x] Functioning [x] Routinely sampled [ ] Good condition
[x] All required wells located [x] Needs Maintenance [ ] N/A

Remarks Wells need general maintenance, such as painting and labeling. Some vegetation control also required. Protection from vehicular traffic (bollards) needs to be evaluated.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Groundwater monitoring has been performed as prescribed in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. Results from this monitoring indicate that concentrations do not exceed target levels. However, this remedy has not been implemented long and insufficient data is available to determine a trend in contaminant concentrations. Confirmatory sampling for radium, barium, chromium, and nickel are also inconclusive at this time.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Operation and maintenance activities are performed as outlined in the *Operations and Maintenance (O&M) Plan for the Implementation of Institutional Controls at the 1998 Mound Plant Property* and the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. DOE has performed annual walk-overs and records reviews with respect to ICs and has found that portion of the remedy to be functioning as intended, thus far. DOE has also performed groundwater monitoring and has found the groundwater remedy to be functioning as intended, thus far.

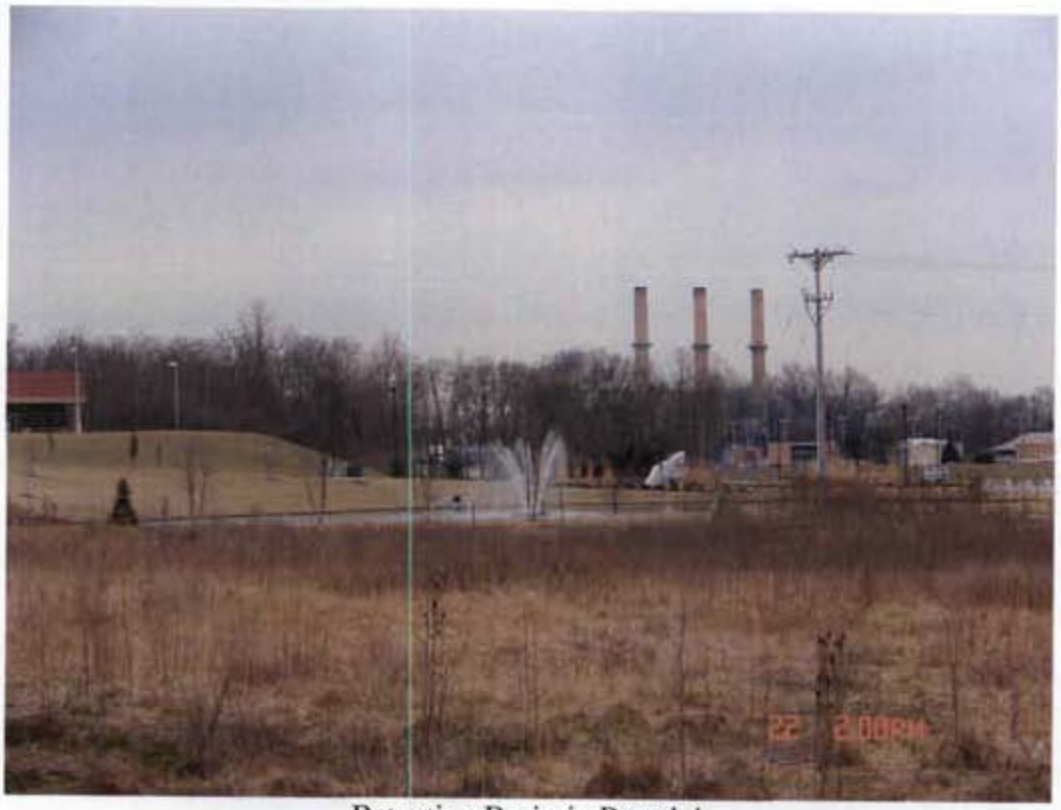
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None

Appendix C

Site Inspection Photographs

Parcel 4 – Looking South

Parcel 4 – View to the South



Retention Basin in Parcel 4

Well 0319 – Phase I

Well 0400 – Phase I

Well 0411 – Phase I

Well 0442 – Phase I

Well 0443 – Phase I

Well 0444 – Phase I

Well 0445 – Phase I

Well P033 – Phase I

Seep 0617 – Phase I

Overview of the OU-1 Area – Looking South

Fencing along North End of OU-1 Landfill

Fencing along NW Corner of OU-1 Landfill

North End of OU-1 Landfill – Looking West

OU-1 Landfill – Looking SW

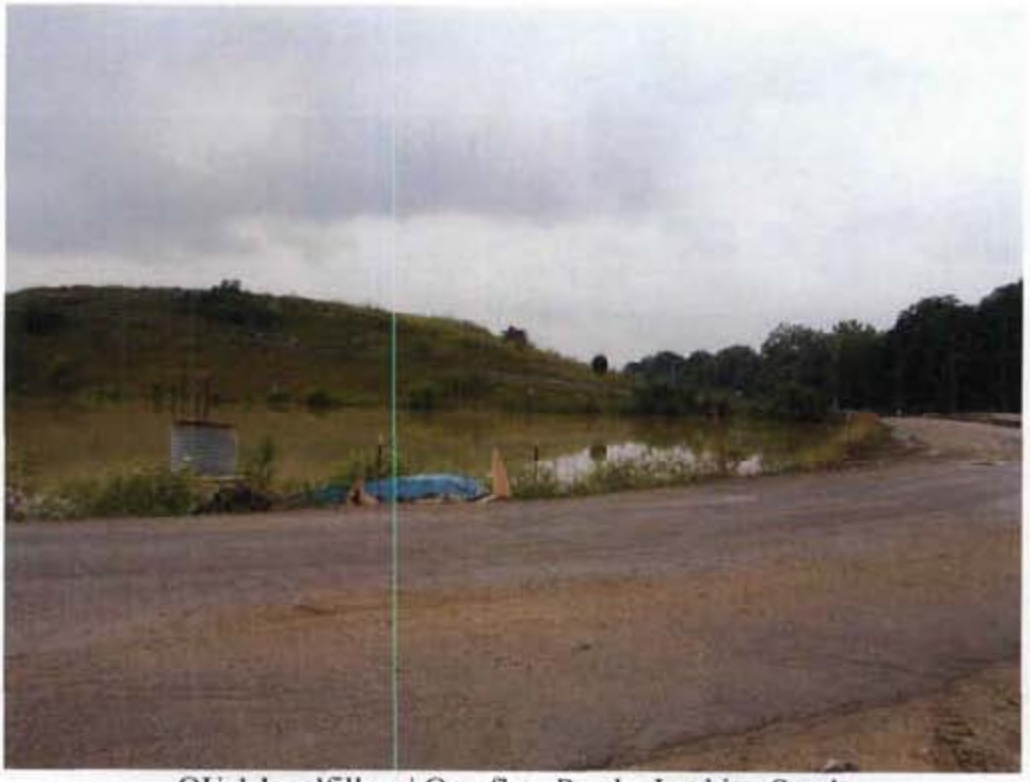
West Side of OU-1 Landfill

SW Corner of OU-1 Landfill – Looking East

OU-1 Landfill – Looking NW

SE Corner of OU-1 Landfill

Overview of OU-1 Area – Looking West



OU-1 Landfill and Overflow Pond – Locking South

Letdown Structure into Overflow Pond

Outfall Structure in Overflow Pond

Vegetation in West Concrete Drainage Ditch and SVE Piping

Drainage along South End of OU-1 Landfill

Drainage at SW Corner of OU-1 Landfill

SVE Point

SVE Point Pressure Gauge

Well 0413 – OU-1 Area

Well 0414 – OU-1 Area

Well 0416 – OU-1 Area

Well 0423 – OU-1 Area

Building 300 – OU-1 Pump and Treatment

Building 301 – SVE System

Buildings 300 and 301

Drewsperse in Building 300

Air Stripper in Building 300

Interior Building 301

Interior Building 301

Interior Building 301