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

September 13, 2021

REPLY TO THE ATTENTION OF:
S-6J

Mr. Brian Zimmerman (*via email only*)
Mound Site Manager
U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway
Harrison, Ohio 45030

Dear Mr. Zimmerman:

Subject: Fifth Five-Year Review Report for the DOE Mound Plant Site dated September 2021

The U.S. Environmental Protection Agency (EPA) has completed its review of the document entitled "Fifth Five-Year Review Report for the Mound, Ohio, Site Miamisburg, Ohio" (FYR Report) dated September 2021. The FYR Report documents the following protectiveness statements made by the Department of Energy for the remedies implemented at the DOE Mound Plant Site and referred to as the Mound, Ohio, Site:

The institutional control (IC) remedies for Parcels D, H, 3, and 4 are currently protective of human health and the environment because ICs are in place that impose restrictions on land and groundwater use and prohibitions on soil removal are functioning as intended. However, for the remedies to be protective in the long term, the following action needs to be taken to ensure protectiveness:

- The determination about possible complete exposure pathways for vapor intrusion (VI) at the Mound site needs to be completed.

The groundwater remedy for Operable Unit 1 (OU-1)/Parcel 9 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent usage of the groundwater in the restricted area. Although the pump-and-treat (P&T) system has been in standby mode since 2014, it is still protective in the short term because monitoring shows the plume is stable (not expanding) and the concentrations and mass of volatile organic compounds (VOCs) are decreasing. The IC portion of the remedy that imposes restrictions on land and groundwater use and prohibition on soil removal is functioning as intended and is protective of human health and the environment.

Recent soil gas data collected within the former OU-1 landfill footprint (Parcel 9) showed that concentrations of vapor-forming chemicals in the subsurface, notably trichloroethene (TCE) and

vinyl chloride, are present at levels that may result in unacceptable risk to building occupants under a commercial/industrial risk scenario if a building was constructed and a complete pathway was present. However, in the short term, the remedy is considered protective because currently there are no receptors and DOE ownership prevents new construction within Parcel 9. For the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Attainment of the cleanup standards in OU-1 groundwater will be required to ensure protectiveness;
- Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site;
- Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site; and
- Approval and implementation of a remedy to address the VI exposure pathway needs to be completed for OU-1/Parcel 9 as part of the CERCLA process.

The remedy for Phase I is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use and prohibition on soil removal is functioning as intended. However, for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Attainment of the cleanup standards in Phase I groundwater will be required to ensure protectiveness;
- Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site;
- Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site; and
- The determination on complete exposure pathways for VI at the Mound site needs to be completed.

The remedy for Parcels 6, 7, and 8 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use, prohibition on soil removal, and prohibition of removal or penetration of concrete floors in specified rooms and areas of T Building is functioning as intended. However, for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Attainment of the cleanup standards in Parcels 6, 7, and 8 groundwater will be required to ensure protectiveness;
- Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site;

- Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site; and
- The determination on complete exposure pathways for VI at the Mound site needs to be completed.

The Site-wide remedy at the Mound site currently protects human health and the environment through ICs that are in place to reduce exposure to contaminated soil and groundwater. Contaminated soil and materials generated during remediation have been removed from the site and disposed of permanently. The underlying soil has been verified to meet cleanup standards that ensure that residual contamination does not pose an unacceptable risk to future users, as long as compliance with the IC that limits land use to commercial/industrial use only is maintained. Currently, groundwater monitoring in Phase I and Parcels 6, 7, and 8 indicate that the groundwater remedies are functioning as required to meet remedial action objectives. The groundwater remedy for OU-1/Parcel 9 continues to function as intended, even though the P&T system continues to be in standby mode while DOE pursues a ROD amendment. Results from interim monitoring indicate that concentrations of VOCs including tetrachloroethene and TCE are decreasing, and the plume is not expanding. However, for the remedy at the Mound site to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Attainment of the cleanup standards in groundwater in Phase I, Parcels 6, 7, and 8, and OU-1;
- Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site;
- Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site;
- An assessment of complete exposure pathways for VI needs to be completed at the site; and
- Approval and implementation of a remedy to address the VI exposure pathway needs to be completed for OU-1/Parcel 9 as part of the CERCLA process.

By this letter, EPA concurs with the protectiveness determinations in the Fifth Five-Year Review Report for the Mound, Ohio, Site, Miamisburg, Ohio dated September 2021.

EPA appreciates the efforts of U.S. Department of Energy staff in conducting this review. Please contact David P. Seely of my staff at (312) 886-7058 if you have any questions.

Sincerely,

X

Douglas Ballotti, Director
Superfund & Emergency Management Division
Signed by: DOUGLAS BALLOTTI

cc: (*via email only*)
Scott Glum,
Site Coordinator
Ohio Environmental Protection Agency
Southwest District Office
Division of Environmental Response and Revitalization
401 East Fifth Street
Dayton, OH 45402-2911

LMS/MND/S31971

Five-Year Review Report

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

September 2021

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Five-Year Review Report

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

September 2021

Approved by:

Brian Zimmerman
Mound Site Manager
U.S. Department of Energy
Office of Legacy Management

Date:

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Abbreviations

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
cis-1,2-DCE	*cis*-1,2-dichloroethene
COC	contaminant of concern
COPC	contaminant of potential concern
Cs	cesium
cVOC	chlorinated volatile organic compound
CY	calendar year
DOE	U.S. Department of Energy
EA	enhanced attenuation
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FYR	Five-Year Review
HI	Hazard Index
IC	institutional control
IRIS	Integrated Risk Information System
LM	Office of Legacy Management
LMS	Legacy Management Support
LTS&M Plan	Long-Term Surveillance and Maintenance Plan
MCL	maximum contaminant level
MDC	Mound Development Corporation (formerly MMCIC)
mg/kg/d	milligrams per kilogram per day
µg/L	micrograms per liter
MMCIC	Miamisburg Mound Community Improvement Corporation (see MDC)
MNA	monitored natural attenuation
nCi/L	nanocuries per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OAC	*Ohio Administrative Code*

ODH	Ohio Department of Health
Ohio EPA	Ohio Environmental Protection Agency
O&M	operations and maintenance
OU	Operable Unit
PCE	tetrachloroethene (also known as perchloroethene)
pCi/L	picocuries per liter
PFAS	per- and polyfluorinated alkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PRG	preliminary remediation goal
PRS	potential release site
P&T	pump-and-treatment
Ra	radium
RAIS	Risk Assessment Information System
RAO	Remedial Action Objective
RBGV	risk-based guideline value
ROD	Record of Decision
RRE	residual risk evaluation
TBC	to-be-considered
TCE	trichloroethene
Th	thorium
trans-1,2-DCE	*trans*-1,2-dichloroethene
U	uranium
VC	vinyl chloride
VI	vapor intrusion
VISL	vapor intrusion screening level
VOC	volatile organic compound

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Executive Summary

This fifth Five-Year Review (FYR) of the remedial actions at the Mound Site[1] (EPA ID OH6890008984 or CERCLIS ID 04935) in Miamisburg, Ohio, has been completed by the U.S. Department of Energy (DOE) Office of Legacy Management. The FYR was conducted in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986. This FYR is a statutory review to ensure that the remedial actions established in the Records of Decision (RODs) for the following areas have been followed and continue to be protective of human health and the environment:

- Parcel D (formerly Release Block D)
- Parcel H (formerly Release Block H)
- Parcel 3 (included former buildings GP-1 and GH)
- Parcel 4 (South Property)
- Phase I (Areas A, B, and C)
- Parcels 6, 7, and 8
- Operable Unit 1 (OU-1)/Parcel 9 (Former Waste Disposal Site)

The OU-4 (Miami-Erie Canal) ROD area, an offsite area impacted by former Mound operations, is not evaluated in this FYR because it was remediated to an unrestricted use end state.

This fifth FYR was prepared using U.S. Environmental Protection Agency (EPA) guidance (EPA 2001), and it is organized as suggested using recommendations from EPA's 2016 recommended template (EPA 2016).

Based on the technical assessment, the remedies are functioning as intended, exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives used at the time of the RODs are still valid. Four issues were identified that need to be evaluated to determine any impacts to the overall protectiveness of the remedies at the site. These issues are:

1. Vapor intrusion assessment – Sitewide: Evaluation of the vapor intrusion (VI) pathway was identified as a sitewide issue during the fourth FYR. A sitewide VI assessment is ongoing. However, Phase II sampling (to determine whether vapor sources are present in the subsurface at concentrations that would result in unacceptable risk if complete exposure pathways were present) has not been completed.
2. Vapor intrusion in OU-1/Parcel 9: Evaluation of the VI pathway was identified as a sitewide issue during the fourth FYR. A sitewide VI assessment is ongoing; however, recent soil-gas data collected within the former OU-1 landfill footprint (Parcel 9) indicated concentrations of vapor-forming chemicals, notably trichloroethene and vinyl chloride, are present in the subsurface that may result in unacceptable risk to building occupants under a commercial/industrial risk scenario if a building was constructed and a complete exposure

[1] The Mound site has also been called the Mound Laboratory, Mound Laboratories, the Mound Plant (EPA ID OH6890008984), the USDOE Mound Plant, the Mound Facility, the USDOE Mound Facility, the Miamisburg Environmental Management Project (MEMP), and the Miamisburg Closure Project (MCP). Currently, LM uses "Mound, Ohio, Site" as the formal name of the site.

pathway was present. Currently there are no receptors, as the property is undeveloped and owned by DOE. This exposure pathway is being addressed as part of an amendment to the OU-1 ROD being proposed by DOE.

3. Emerging contaminants–Phase I, Parcels 6, 7, and 8, and OU-1/Parcel 9: Two contaminants, perchlorate and 1,4-dioxane, from the EPA emerging contaminant list, may have been used or associated with other chemicals used as part of the historical processes at the Mound site. These two contaminants will be retained for further evaluation.

4. Emerging contaminants–Parcels 6, 7, and 8: The evaluation of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) was performed as part of the fourth FYR. EPA has since expanded its review of PFOS and PFOA to include a broad category of chemicals or products that contain per- and polyfluoroalkyl substances (PFAS) and practices and processes that may have used these chemicals, including metal plating and plastics production, both of which were performed at the Mound site. It is possible that chemicals that contain PFAS could have been used; therefore, PFAS have been retained for further evaluation.

This fifth FYR determined the following:

- The institutional control (IC) remedies for Parcels D, H, 3, and 4 that impose restrictions on land and groundwater use and prohibition on soil removal are functioning as intended and are currently protective of human health and the environment. The determination on complete exposure pathways for VI at the Mound site, which includes evaluation in these parcels, needs to be completed to ensure protectiveness.
- The remedy for Phase I is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use and prohibition on soil removal is functioning as intended and is protective of human health and the environment. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Phase I groundwater will be required, and both the evaluation of the potential historical use of three emerging contaminants (PFAS, perchlorate, and 1,4-dioxane) at the site and the determination on complete exposure pathways for VI at the Mound site, which includes evaluation in Phase I, need to be completed to ensure protectiveness.
- The remedy for Parcels 6, 7, and 8 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use and prohibition on soil removal is functioning as intended and is protective of human health and the environment. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Parcels 6, 7, and 8 groundwater will be required, and both the evaluation of the potential historical use of three emerging contaminants (PFAS, perchlorate, and 1,4-dioxane) at the site and the determination on complete exposure pathways for VI at the Mound site, which includes evaluation in Parcel 6, 7, and 8, need to be completed to ensure protectiveness.
- The remedy for OU-1/Parcel 9 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled

through ICs that prevent usage of the groundwater in the restricted area. Although the pump-and-treatment system has been in standby mode since 2014, it is still protective in the short term because monitoring shows the plume is stable (not expanding) and the concentrations and mass of the volatile organic compounds (VOCs) are decreasing. The IC portion of the remedy that imposes restrictions on land and groundwater use and prohibition on soil removal is functioning as intended and is protective of human health and the environment. However, for the remedy to be protective in the long term, attainment of the cleanup standards in OU-1 groundwater will be required, and both the evaluation of the potential historical use of three emerging contaminants (PFAS, perchlorate, and 1,4-dioxane) at the site and the development and implementation of a CERCLA remedy to address the VI exposure pathway to future building occupants need to be completed to ensure protectiveness.

This is the fifth statutory FYR for the Mound site. The next FYR will be conducted in 2026.

Fifth Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Mound Plant (DOE) also known as the Mound Plant, Miamisburg Environmental Management Project (MEMP), and Miamisburg Closure Project (MCP)		
EPA ID: OH68900089894		
Region: 5	**State:** OH	**City/County:** Miamisburg / Montgomery
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]*:** U.S. Department of Energy – Legacy Management		
Author name (Federal or State Project Manager): Brian Zimmerman		
Author affiliation: DOE-LM		
Review period: 9/10/2020–9/16/2021		
Date of site inspection: 2/11/2021		
Type of review: Statutory		
Review number: 5		
Triggering action date: 9/16/2016		
Due date *(five years after triggering action date)*: 9/16/2021		

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) has conducted a fifth Five-Year Review (FYR) of the remedial actions implemented at the Mound Site (EPA ID OH6890008984) in Miamisburg, Ohio. LM is responsible for conducting the FYR at sites under its jurisdiction, while the U.S. Environmental Protection Agency (EPA) is responsible for concurrence with the review or issuing independent findings.

1.1 Purpose

The purpose of the FYR is to determine whether the remedies selected in the Records of Decision (RODs) for the site are protective of human health and the environment. Protectiveness is determined by evaluating the implementation and performance of the selected remedies in accordance with the *Comprehensive Five-Year Review Guidance* (EPA 2001). This FYR report documents the review methods, findings, and conclusions; identifies issues found during the review, if any; and recommends actions to address any issues.

1.2 Authority

This FYR was conducted in accordance with the *Comprehensive Five-Year Review Guidance* (EPA 2001), which states that Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986:

> Requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the site be subject to a FYR. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) further provides that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining at the 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.

FYRs are required by statute. Their implementation must be consistent with CERCLA and NCP. CERCLA Section 121, 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.

Title 40 *Code of Federal Regulations* Section 300 (40 CFR 300), NCP, 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" [40 CFR 300.430(f)(4)(ii)].

1.3 Scope

This fifth FYR that was initiated on September 10, 2020, is based on analytical data and information obtained from January 2016 to May 2021 and published in reports reviewed by the regulatory agencies. The triggering action for this review was the fourth FYR (DOE 2016a), which was finalized September 16, 2016. Previous FYRs were completed in 2001, 2006, and 2011, respectively (DOE 2001a; DOE 2006; DOE 2011a). A statutory review is required under CERCLA that requires a FYR be performed upon completion of a remedial action that results in substances, pollutants, or contaminants remaining onsite at levels that do not allow for unlimited use and unrestricted exposure.

There are eight areas of the site where RODs were prepared to document the remedial actions to address remaining contaminants. These areas are:

- Parcel D (formerly Release Block D) (DOE 1999c)
- Parcel H (formerly Release Block H) (DOE 1999d)
- Parcel 3 (DOE 2001b)
- Parcel 4 (DOE 2001c)
- Phase I (Areas A, B, and C) (DOE 2003b)
- Parcels 6, 7, and 8 (DOE 2009)
- Operable Unit 1 (OU-1)/Parcel 9 (Former Waste Disposal Site) (DOE 1995; DOE 2011b)

The OU-4 (Miami-Erie Canal) (DOE 2004) is not included in this FYR because it was remediated to an unlimited use end state.

This FYR is prepared in accordance with the *Comprehensive Five-Year Review Guidance* (EPA 2001) and organized as suggested by the recommended template EPA released in 2016 that provides for a streamlined report to minimize information that was presented in previous FYRs. This FYR focuses on remedy monitoring, actions, and issues over the past 5 years and on recommendations and protectiveness for the next 5 years. To facilitate this effort, references are provided in the appropriate sections of this FYR that contain the background and supporting information pertaining to that section.

1.4 Background

The Mound site was established in 1948 by the U.S. Atomic Energy Commission, a predecessor to DOE, as an integrated research, development, and production facility that supported the nation's weapons and energy programs. Early programs at the Mound site focused on the fabrication of neutron and alpha sources for weapon and nonweapon use. Investigations involving other radionuclide sources and recovery were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, the separation of stable isotopes began at the Mound site. As a result of the discovery of volatile organic compounds (VOCs) in groundwater used as both production and drinking water, the Mound site was placed on the National Priorities List on November 21, 1989.

The areas that make up the site are shown on Figure 1. A more in-depth description of each area and history of contamination is available in the fourth FYR (DOE 2016a) and in the CERCLA 120(h) summary notices prepared for each ROD parcel listed below:

- *CERCLA 120(h) Summary Notice of Hazardous Substances, Release Block D, Mound Plant, Miamisburg, Ohio*, Final, February 1999 (DOE 1999a)
- *CERCLA 120(h) Summary Notice of Hazardous Substances, Release Block H, Mound Plant, Miamisburg, Ohio*, Final, July 1999 (DOE 1999b)
- *Parcel 3 Environmental Summary, CERCLA 120(h) Summary Notice of Hazardous Substances, Mound Plant, Miamisburg, Ohio*, Final, September 2001 (DOE 2001d)
- *Parcel 4 Environmental Summary, CERCLA 120(h) Summary Notice of Hazardous Substances, Mound Plant, Miamisburg, Ohio*, Final, March 2001 (DOE 2001e)
- *Phase I Environmental Summary, CERCLA 120(h) Summary Notice of Hazardous Substances, Mound Plant, Miamisburg, Ohio*, Final, December 2003 (DOE 2003a)
- *Parcels 6, 7, and 8 Environmental Summary, CERCLA 120(h) Summary Notice of Hazardous Substances, Mound Plant, Miamisburg, Ohio*, Final, August 2010 (DOE 2010)
- *Parcel 9 Environmental Summary, CERCLA 120(h) Summary Notice of Hazardous Substances, Mound Plant, Miamisburg, Ohio*, Final, July 2011 (DOE 2011c)

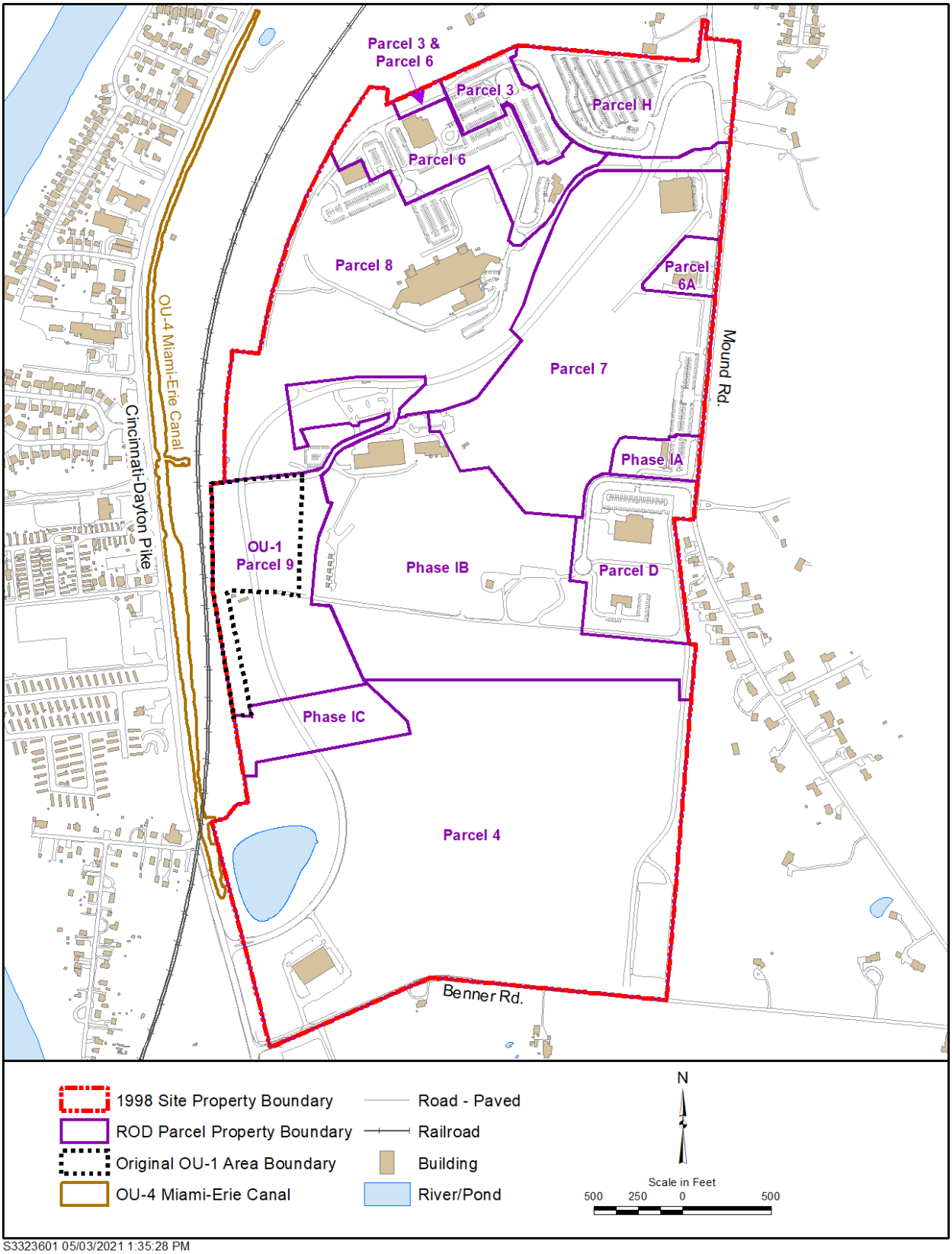

Figure 1. Mound Site ROD Parcels

2.0 Response Action Summary

Eight RODs and one ROD Amendment have been prepared for areas at the Mound site (Table 1). This section summarizes the basis for taking action, response actions, sitewide institutional controls (ICs), and operations and maintenance (O&M) costs.

Table 1. Summary of CERCLA RODs and Remedies

Parcel	ROD Title	Remedy	Media	Approval Date
D	*Record of Decision for Release Block D, Mound Plant, Miamisburg, Ohio,* Final (DOE 1999c)	ICs	Soil Buildings Groundwater	February 1999
H	*Record of Decision for Release Block H, Mound Plant, Miamisburg, Ohio,* Final (DOE 1999d)	ICs	Soil Buildings Groundwater	June 1999
3	*Parcel 3 Record of Decision, Mound Plant, Miamisburg, Ohio,* Final (DOE 2001b)	ICs	Soil Buildings Groundwater	September 2001
4	*Parcel 4 Record of Decision, Mound Plant, Miamisburg, Ohio,* Final (DOE 2001c)	ICs	Soil Buildings Groundwater	February 2001
6, 7, and 8	*Parcels 6, 7, and 8 Record of Decision, Miamisburg Closure Project, Miamisburg, Ohio,* Final (DOE 2009)	MNA ICs	Soil Buildings Groundwater	August 2009
OU-1/Parcel 9	*Operable Unit 1 Record of Decision,* Final (DOE 1995)	Hydraulic containment surface water controls long-term groundwater monitoring	Groundwater	June 1995
	Amendment of the Operable Unit 1 Record of Decision, U.S. Department of Energy, Mound Closure Project, Final (DOE 2011b)	ICs	Soil Groundwater	August 2011
Phase I (A, B, C)	*Phase I Record of Decision, Miamisburg Closure Project,* Final (DOE 2003b)	MNA ICs	Soil Buildings Groundwater	July 2003
OU-4	*Miami-Erie Canal Record of Decision, Miamisburg Closure Project,* Final, Revision 0 (DOE 2004)	No action	Soil	September 2004

Abbreviation:
MNA = monitored natural attenuation

2.1 Basis for Taking Action

In 1995, DOE, EPA, and Ohio Environmental Protection Agency (Ohio EPA) adopted the Mound 2000 Process to address the site's environmental restoration issues. The Mound 2000 Process established a Mound Core Team (also called the Core Team) of representatives from DOE, EPA, and Ohio EPA whose mission was to ensure that environmental restoration activities achieved protection of human health and the environment for the anticipated future industrial land use.

The Core Team developed the *Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach* (DOE 1999e) (Mound 2000 Process) to provide the basis for evaluating site conditions and justifying the release of portions of the site to the community for industrial use.

DOE and its regulators agreed to evaluate smaller areas (designated as potential release sites [PRSs]) or buildings separately to address soil and building contamination rather than using the traditional CERCLA process. DOE used removal action authority to remediate the PRSs as needed with a goal that no additional remediation would be required, and ICs would be implemented as the final remedy to ensure industrial/commercial land use. Verification data collected after removals of soil and other materials were used to evaluate the additional risk contributed by the residual materials.

The framework for evaluating human health risks associated with remaining residual contamination was outlined in the Mound 2000 Process. This evaluation was applied to an area once any necessary remediation had been completed and the remaining PRSs or buildings had been designated as requiring no further assessment.

RODS for each area (with the exception of the 1995 OU-1 ROD) were developed based on the final risks remaining after the removal of soil, buildings, and other structures as outlined in the Mound 2000 Process. The Core Team evaluated more than 400 PRSs and recommended the appropriate response based on process knowledge, site visits, and existing data. Using removal action authority as outlined in the Mound 2000 Process, DOE removed buildings, slabs, soils, underground tanks, and lines to remediate the former DOE Mound site to EPA's risk-based standards for industrial/commercial use only. The offsite OU-4 Miami Erie Canal was remediated to unrestricted use.

The primary remediation objective was to ensure that any residual risk associated with each parcel was acceptable based on the agreed-upon industrial/commercial end use as the only use. Remedies for each parcel were developed in accordance with that agreement. The final remedies evaluated the conditions postremoval and evaluation of residual soil and groundwater contaminants within each land parcel determined 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 is maintained. The Phase I (A, B, C) and Parcels 6, 7, and 8 remedies include monitored natural attenuation (MNA) for those contaminants that exceed maximum contaminant levels (MCLs) in groundwater.

The remedy to address OU-1 was developed before the Mound 2000 Process. In June 1995, DOE finalized the OU-1 ROD to address contaminated groundwater originating from the landfill area. The OU-1 remedial action in the 1995 ROD was designed to control groundwater contamination (primarily low-level VOCs) to prevent migration of contamination toward the plant production wells, and to minimize exposure to potential receptors. The pathway of concern consisted 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 City of Miamisburg's municipal water supply.

The OU-1 landfill was excavated as part of two non-CERCLA actions from 2007 to 2010. These excavations were undertaken to support future redevelopment of the property by the Mound Development Corporation (MDC). The excavation areas were evaluated for human health risks associated with remaining residual contamination as outlined in the *Mound 2000 Residual Risk Evaluation Methodology.* An amendment to the OU-1 ROD was issued in 2011 expanding the area of OU-1 and designated it as Parcel 9. It imposed the same ICs that were included in the rest of the site RODs. The groundwater remedy remained unchanged.

Monitoring required for the remedies is outlined in the *Operations and Maintenance Plan for the U.S. Department of Energy Mound, Ohio, Site*, hereafter referred to as the O&M Plan (DOE 2015). This plan provides the sampling locations, frequencies, and analytes, data evaluation requirements, and contingency actions should data indicate unanticipated changes. Also included are inspection requirements for the annual IC assessments and the CERCLA FYR.

2.2 Response Actions

The following sections outline the Remedial Action Objectives (RAOs), remedies outlined in each of the RODs, modifications to the remedy (if applicable), and O&M.

2.2.1 Parcels D, H, 3, and 4

This section focuses on the RODs for Parcel D, H, 3, and 4. These four areas are combined in this FYR because they all have ICs as their primary remedy. ICs are discussed in greater detail in subsequent sections.

Area: Parcels D, H, 3, and 4

ROD remedy: ICs

RAOs: Reduce exposure to remaining soil and groundwater by:

- Prohibiting residential or agricultural land use or activities that could result in the chronic exposure of children under 18 years of age to soil or groundwater from the premises.
- Prohibiting the extraction, consumption, exposure, or use in any way of the groundwater underlying the Mound site.
- Prohibiting the removal of soil from the Mound site.

Modifications: None

O&M: Annual IC assessments as outlined in the O&M Plan

2.2.2 Phase I

This section focuses on the ROD remedy that was implemented in the Phase I area after completion of buildings and soil removal in accordance with the Mound 2000 Process.

Area: Phase I

ROD remedy: MNA and ICs

RAOs: Reduce exposure to remaining soil and groundwater by:

- Prohibiting residential or agricultural land use or activities that could result in the chronic exposure of children under 18 years of age to soil or groundwater from the premises.
- Prohibiting the extraction, consumption, exposure, or use in any way of the groundwater underlying the Mound site.
- Prohibiting the removal of soil from the Mound site.
- Protecting the Buried Valley Aquifer (BVA) by verifying that the concentrations of trichloroethene (TCE) in the vicinity of well 0411, well 0443, and seep 0617 are decreasing and that TCE is not impacting the BVA.
- Demonstrating the reduction of TCE to concentrations below the MCL in well 0411, well 0443, and seep 0617.

Modifications: The MNA program has been modified as follows:

- Discontinue monitoring of barium and radium calendar year ([CY] 2012)
- Discontinue monitoring in wells 0442, 0400, 0402, and P033 (CY 2018)
- Install well P064 (CY 2017)
- Reduce monitoring frequency for VOCs from quarterly to semiannually (CY 2008)

O&M: Groundwater and seep monitoring and annual IC assessments are performed as outlined in the O&M Plan.

2.2.3 Parcels 6, 7, and 8

This section focuses on the ROD remedy that was implemented in the Parcels 6, 7, and 8 area after completion of building and soil removal in accordance with the Mound 2000 Process.

Area: Parcels 6, 7, and 8

ROD remedy: MNA and ICs

RAOs: Reduce exposure to remaining soil and groundwater by:

- Prohibiting residential or agricultural land use or activities that could result in the chronic exposure of children under 18 years of age to soil or groundwater from the premises.
- Prohibiting the extraction, consumption, exposure, or use in any way of the groundwater underlying the Mound site.
- Prohibiting the removal of soil from the Mound site.
- Prohibiting removal of concrete from the floor of specified rooms in T Building.
- Prohibiting penetration of the concrete floor in T Building specified areas.
- Protecting the downgradient BVA by verifying that TCE concentrations in the vicinity of wells 0315 and 0347 are decreasing and not impacting the BVA.
- Monitoring the reduction of TCE concentrations to determine if they fall below the MCL in wells 0315 and 0347 and to verify the hypothesis that natural decomposition of TCE will result in concentrations below the MCL over time.

- Monitoring the reduction of TCE and tetrachloroethene (PCE) concentrations to determine if those parameters fall below the MCLs in seeps 0601, 0602, 0605, 0606, and 0607 and to verify the hypothesis that the removal of the TCE and PCE sources will result in concentrations below the MCL over time.
- Monitoring the reduction of tritium activity to determine if levels fall below the MCL in the seeps and to verify that hypothesis that the removal of tritium sources will result in levels below the MCL over time.

Modifications: The MNA program has been modified as follows:

- Reduce monitoring frequency for tritium from quarterly to semiannually (CY 2012)

O&M: Groundwater and seep monitoring and annual IC assessments are performed as outlined in the O&M Plan.

2.2.4 Operable Unit 1/Parcel 9

This section focuses on the 1995 ROD remedy that was implemented in the OU-1 area and in the expanded Parcel 9 area on the 2011 ROD Amendment that was implemented after completion a non-CERCLA removal of the former landfill that was performed in accordance with the Mound 2000 Process.

Area: OU-1/Parcel 9

ROD remedy: Hydraulic containment via pump-and-treatment (P&T) system, treatment and discharge of groundwater and ICs

RAOs: Reduce exposure to remaining soil and groundwater by:

- Prohibiting residential or agricultural land use or activities that could result in the chronic exposure of children under 18 years of age to soil or groundwater from the premises.
- Prohibiting the extraction, consumption, exposure, or use in any way of the groundwater underlying the Mound site.
- Prohibiting the removal of soil from the Mound site.
- Preventing the ingestion of water with contaminant concentrations that exceed the remediation goals of 1×10^{-4} aggregate cancer risk for chemical and radiological risk combined.
- Controlling or reducing (to remediation goals) contaminant concentrations in the area of the aquifer adjacent to OU-1.

Modifications: The ROD remedy has been modified as follows:

- Expanded the geographic area of OU-1 (2011 ROD Amendment) (DOE 2011b)
- Added land use restrictions, prohibition of soil removal and groundwater use limitations through ICs (2011 ROD Amendment) (DOE 2011b)
- Modified the monitoring locations due to the removal of wells during excavation activities
- The P&T system has remained in stand-by mode since 2012 to accommodate the enhanced attenuation (EA) field demonstration for VOCs in groundwater and the groundwater remedy change process

O&M: Groundwater monitoring, operation of the P&T system, and annual IC assessments are performed as outlined in the O&M Plan.

2.2.5 Operable Unit 4

This section focuses on ROD prepared for the OU-4 area after completion of soil removal in accordance with the Mound 2000 Process. Based on the residual risk evaluation (RRE) it was determined that no action was required.

2.3 Sitewide Institutional Controls

ICs are an important component of all the remedies selected for the Mound site. ICs are nonengineered instruments, such as administrative and legal controls that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action. Table 2 summarizes the associated legal instruments for each ROD. The following sections discuss the ICs, which run with the land in the form of restrictions and covenants in quitclaim deeds or activity and use limitations in the environmental covenant.

2.3.1 Maintain Industrial/Commercial Land Use and Prohibit Residential Land Use

The RODs and ROD Amendment state that land use will be industrial/commercial only. The RODs detail specific land uses that will not be permitted onsite, but the list in the RODs is not all-inclusive. Land parcels may not be used for any residential or farming activities or for any other activities that could result in the chronic exposure of children less than 18 years of age to soil or groundwater from the premises. Prohibited land uses listed in the RODs include, but are not limited to, single or multifamily dwellings or rental units; schools or other educational facilities for children under 18 years of age; childcare facilities; and community centers, playgrounds, or other recreational or religious facilities for children less than 18 years of age.

2.3.2 Prohibit Use of Groundwater from Within the Site Boundary

The RODs and ROD Amendment prohibit the extraction, consumption, exposure, or use in any way of the groundwater underlying the Mound site without prior written approval of EPA and Ohio EPA. Landowners must obtain written approval from EPA and Ohio EPA to install a new well.

2.3.3 Prohibit Removal of Soil from Site to Offsite Locations

The RODs and ROD Amendment prohibit the removal of soil from the Mound site without prior written approval from EPA, Ohio EPA, and Ohio Department of Health (ODH). The soil at the site has not been evaluated for any use other than onsite industrial/commercial use. Any offsite use or disposal without proper handling, sampling, and management could create an unacceptable risk to offsite receptors. The Core Team developed the soil removal request protocol, which is provided in the O&M Plan for guidance during normal construction activities onsite. Because the Mound Business Park site boundary could change over time, the restriction applies to soil within the 1998 Mound site boundary except for road right-of-way areas exempted in the LM quitclaim deeds. Table 2 details the legal instruments for the Mound site's IC remedies.

Table 2. Mound Site IC Legal Instruments Summary Table

<table>
<tr><th>ROD Parcel</th><th>Former ID or Other Names</th><th colspan="2">Legal Instruments[a]</th></tr>
<tr><td>D</td><td>Release Block D</td><td>Quitclaim Deed: 02-146503, 11-22-2002</td><td rowspan="5">The original quitclaim deeds for Parcels 3, 4, D, H, and were replaced and combined with the Quitclaim Deed 09-011643, 02-24-2009 for Phase I</td></tr>
<tr><td>H</td><td>Release Block H</td><td>Quitclaim Deed: 02-146504, 11-22-2002</td></tr>
<tr><td>3</td><td>None</td><td>Quitclaim Deed: 02-028206, 10-18-2002</td></tr>
<tr><td>4</td><td>South Property</td><td>Quitclaim Deed: 02-128007, 10-17-2002</td></tr>
<tr><td rowspan="3">Phase I</td><td>A</td><td rowspan="3">Quitclaim Deed: 09-011643, 02-24-2009</td></tr>
<tr><td>B</td></tr>
<tr><td>C</td></tr>
<tr><td>6</td><td rowspan="3">Parcels 6, 7, and 8</td><td colspan="2" rowspan="3">Quitclaim Deed: 12-00083743, 12-19-2012 for 995 Mound Road
Quitclaim Deed: 17-00055321, 09-19-2017 for 885 Mound Road
Quitclaim Deed: 17-00045599, 08-04-2017 for 930 Capstone Drive
Quitclaim Deed: 18-00006246, 01-31-2018 for 460 and 480 Vantage Point and lot on north hillside
Quitclaim Deed: 18-00064591, 11-01-2018 for 945 Capstone Drive
Quitclaim Deed: 19-00061640, 11-05-2019 for remainder of Parcels 6, 7, and 8 plus a part of Parcel 9

Environmental Covenant approved 12-22-11, which was filed as a Special Instrument (Deed): 12-00004722,01-24-2012

(LM retains ownership of four parcels within Parcel 9)</td></tr>
<tr><td>7 (and 6A)</td></tr>
<tr><td>8</td></tr>
<tr><td>9</td><td>OU-1</td></tr>
<tr><td>OU-4</td><td>Miami-Erie Canal</td><td>None required</td><td>Not applicable</td></tr>
</table>

Note:
[a] Quitclaim deeds and the Environmental Covenant are filed in county records in Montgomery County, Ohio.

2.3.4 Prohibit Removal of Concrete from Floor in Specified Rooms of T Building

The Parcels 6, 7, and 8 ROD prohibits the removal of concrete from the floor in T Building controlled areas with special ICs (Figure 2) to offsite locations without prior written approval from EPA, Ohio EPA, and ODH. Removing concrete from these areas could result in an unacceptable exposure. The Core Team developed the protocol provided in Appendix B of the O&M Plan in the event a property owner wishes to remove concrete.

2.3.5 Prohibit Penetration of Concrete Floors in Specified Rooms of T Building

The Parcels 6, 7, and 8 ROD prohibits penetration of the concrete floor in T Building controlled areas with special ICs (Figure 2) without prior written approval from EPA, Ohio EPA, and ODH. Drilling, sawing, or otherwise penetrating concrete from these areas could result in an unacceptable exposure to the equipment operator and other workers in the area. The Core Team developed the protocol provided in the O&M Plan in the event a property owner wishes to penetrate concrete.

2.3.6 Allow Site Access for Federal and State Agencies for Sampling and Monitoring

The RODs and ROD Amendment require continued site access by DOE, EPA, Ohio EPA, and ODH to conduct inspections and to perform the monitoring required by the ROD remedies. The deeds and environmental covenant grant the right of access for environmental investigation or remedial action.

2.4 O&M Costs

Costs associated for each remedy are not tracked separately. The total O&M costs for inspections, groundwater monitoring, sample analysis, data management, reporting, and inspection and maintenance of the OU-1 P&T system are included in Table 3. In addition, Table 3 provides the cost of the OU-1 Enhanced Attenuation Field Demonstration project that occurred from 2016 to 2018.

Table 3. General O&M Costs for the Mound Site

Year	O&M Cost	OU-1 Field Demonstration Cost	Combined O&M Cost
2016	$332,410	$105,745	$438,155
2017	$221,328	$166,614	$387,942
2018	$202,113	$65,591	$267,704
2019	$199,123	NA	$199,123
2020	$183,509	NA	$183,509
Total	$1,138,483	$337,950	$1,478,449

Abbreviation:
NA = not applicable

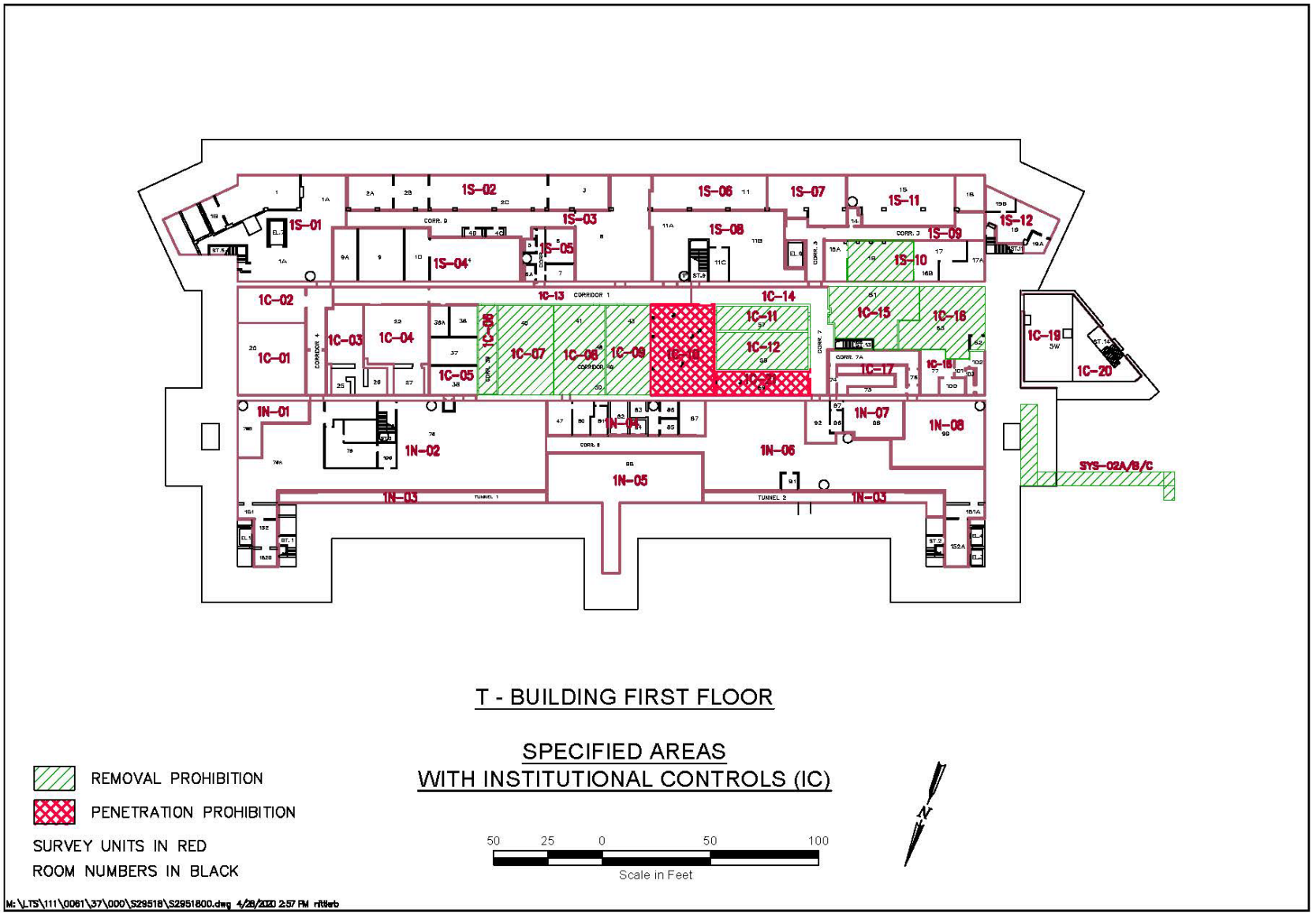

Figure 2. Mound Site T Building Specified Areas With Institutional Controls

3.0 Progress Since the Last FYR

This section reviews the protectiveness determinations and statements (Table 4) and two issues and their associated recommendations identified from the fourth FYR. The current status of these two issues is discussed below.

Table 4. Protectiveness Determinations/Statements from the 2016 FYR

OU Designation	Protectiveness Determination	Protectiveness Statement
OU-1/ Parcel 9	Short-term protective	The remedy for OU-1/Parcel 9 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through containment of the plume and ICs that prevent usage of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in OU-1 groundwater will be required to ensure protectiveness. The IC portion of the remedy for OU-1/Parcel 9 is protective of human health and the environment because ICs are in place and functioning as intended.
Parcels D, H, 3, and 4	Protective	The IC remedies for Parcels D, H, 3, and 4 and the IC portion of the remedies for Phase I (A, B, C); Parcels 6, 7, and 8; and OU-1 are protective of human health and the environment because ICs are in place and functioning as intended.
Phase I (A, B, C)	Short-term protective	The remedy for Phase I is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Phase I groundwater will be required to ensure protectiveness. Monitoring of bedrock groundwater will continue to demonstrate that MNA is effectively reducing TCE to concentrations below the MCL. Monitoring of the BVA will continue to demonstrate the aquifer is not affected by TCE-impacted groundwater originating from Phase I.
Parcels 6, 7, and 8	Short-term protective	The remedy for Parcels 6, 7, and 8 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Parcels 6, 7, and 8 groundwater will be required to ensure protectiveness. Monitoring of seeps and onsite wells will continue to demonstrate that with the removal of PCE, TCE, and tritium sources, natural degradation will result in these constituents reducing to concentrations below the MCLs. Monitoring of the BVA will continue to demonstrate the aquifer is not affected by impacted groundwater originating from Parcels 6, 7, and 8.
Sitewide	Short-term protective	The remedies in place at the Mound site currently protect human health and the environment through ICs that are in place to reduce exposure to contaminated soil and groundwater. However, for the remedies to be protective in the long term, the determination on complete exposure pathways for VI and a determination regarding the use of per- and polyfluorinated alkyl substances (PFAS) at the Mound site need to be completed by the Mound Core Team.

3.1 Sitewide

Fourth FYR Protectiveness Determination: Short-term protective

Fourth FYR Protectiveness Statement: The remedies in place at the Mound site currently protect human health and the environment through ICs that are in place to reduce exposure to contaminated soil and groundwater. However, for the remedies to be protective in the long term, the determination on complete exposure pathways for vapor intrusion (VI) and a determination regarding the use of per- and polyfluorinated alkyl substances (PFAS) at the Mound site need to be completed by the Mound Core Team.

Fourth FYR Issues and Recommendations: Table 5 summarizes the issues and recommendations from the fourth FYR and the status of the recommendations.

Actions Taken Since Last FYR: Refer to Table 5.

Table 5. Status of Recommendations from the 2016 FYR

Issue (Sitewide)	Recommendation	Status	Current Implementation Status Description*	Completion Date
Vapor Intrusion (VI): Evidence indicates the presence of vapor-forming chemicals in the subsurface at the Mound site. Information reviewed to date is not sufficient to evaluate whether complete exposure pathways are present under current or reasonably expected future conditions. However, the information reviewed does not prompt immediate response action.	It is recommended that an assessment of current site data be performed to evaluate if possible exposure pathways are or could be present that would result in potential exposure in existing and future buildings and structures at the Mound site as outlined in the OSWER Technical Guide (EPA 2015). The assessment will prioritize areas with existing buildings and may include indoor air quality testing as well as sampling of subsurface vapors in or near existing buildings. If additional work is warranted, this assessment will include a proposal for additional work and an associated schedule. If it is determined during this assessment that conditions exist that may pose a health risk to building occupants, the Mound Core Team will be contacted immediately, and a course of action will be developed.	Completed	The *Vapor Intrusion Assessment Work Plan at the Mound, Ohio, Site* (DOE 2017c) was prepared in May 2017 that outlined the approach to ascertain whether there are complete VI exposure pathways present at the Mound site. It was determined that the VI assessment would be performed in a phased approach, with Phase I consisting of an initial assessment of possible vapor sources and development of a VI conceptual model. Phase II consisted of potential source areas characterization, and Phase III consisted of sampling associated with areas where complete exposure pathways were found to be present. The *Vapor Intrusion Assessment: Phase I Preliminary Screening and Conceptual Model for the Mound, Ohio, Site* (DOE 2019f) was finalized in March 2019. This report identified that vapor-forming chemicals are present in the soil, groundwater, and soil-gas at the site. The report identified potential vapor source areas and a list of chemicals for further evaluation. A schedule for performing additional work was included.	Completed: 3/18/2019

Table 5. Status of Recommendations from the 2016 FYR (continued)

Issue (Sitewide)	Recommendation	Status	Current Implementation Status Description*	Completion Date
			The Core Team agreed that this report closed this 2016 issue; however, the VI assessment project continues. LM is reviewing and addressing Core Team comments on the revised draft *Phase II Sampling and Analysis Plan* and the revised draft *Quality Assurance Project Plan*.	
PFAS/PFOS: A significant body of historical documentation and chemical inventories has been compiled regarding the use of PFAS or AFFF at the Mound site. Results of this review indicate that these chemicals or materials were not used at the Mound site as fire suppressants, although small quantities were used as calibration standards. An evaluation of this information needs to be completed by the Mound Core Team (DOE, EPA, and Ohio EPA) and a determination regarding the protectiveness of the site conditions needs to be established.	It is recommended that the results of the PFAS research be presented, along with a written summary, to the Mound Core Team.	Completed	The *Summary of Per- or Polyfluorinated Alkyl Substances Records Search for indications of Use at the Mound Site* report (DOE 2016b) was finalized and presented to the Core Team in December 2016. A final report was prepared in January 2017 and documented that these chemicals or materials were not used at the Mound site as fire suppressants, although small quantities were used as calibration standards. The Core Team agreed that this issue is closed, and no additional action is required.	Report completed: 1/9/2017 Ohio EPA approved: 4/14/2017 EPA approved: 12/4/2017

Abbreviations:
AFFF = aqueous film-forming foam
PFAS = per- and polyfluorinated alkyl substances
PFOS = perfluorooctane sulfonate
VI = vapor intrusion

3.2 Parcels D, H, 3, and 4

Fourth FYR Protectiveness Determination: Protective

Fourth FYR Protectiveness Statement: The IC remedies for Parcels D, H, 3, and 4 and the IC portion of the remedies for Phase I (A, B, C); Parcels 6, 7, and 8; and OU-1 are protective of human health and the environment because ICs are in place and functioning as intended.

Fourth FYR Recommendations: None

Actions Taken Since Last FYR: Not applicable

3.3 Phase I

Fourth FYR Protectiveness Determination: Short-term protective

Fourth FYR Protectiveness Statement: The remedy for Phase I is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Phase I groundwater will be required to ensure protectiveness. Monitoring of bedrock groundwater will continue to demonstrate that MNA is effectively reducing TCE to concentrations below the MCL. Monitoring of the BVA will continue to demonstrate the aquifer is not affected by TCE-impacted groundwater originating from Phase I.

The IC portion of the remedy for Phase I (A, B, C) is protective of human health and the environment because ICs are in place and functioning as intended.

Fourth FYR Recommendations: None

Actions Taken Since Last FYR: Not applicable

3.4 Parcels 6, 7, and 8

Fourth FYR Protectiveness Determination: Short-term protective

Fourth FYR Protectiveness Statement: The remedy for Parcels 6, 7, and 8 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in Parcels 6, 7, and 8 groundwater will be required to ensure protectiveness. Monitoring of seeps and onsite wells will continue to demonstrate that with the removal of PCE, TCE, and tritium sources, natural degradation will result in these constituents reducing to concentrations below the MCLs. Monitoring of the BVA will continue to demonstrate the aquifer is not affected by impacted groundwater originating from Parcels 6, 7, and 8.

Fourth FYR Recommendations: None

Actions Taken Since Last FYR: Not applicable

3.5 OU-1/Parcel 9

Fourth FYR Protectiveness Determination: Short-term protective

Fourth FYR Protectiveness Statement: The remedy for OU-1/Parcel 9 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through containment of the plume and ICs that prevent usage of the groundwater in the restricted area. However, for the remedy to be protective in the long term, attainment of the cleanup standards in OU-1 groundwater will be required to ensure protectiveness.

The IC portion of the remedy OU-1/Parcel 9 is protective of human health and the environment because ICs are in place and functioning as intended.

Fourth FYR Recommendations: None

Actions Taken Since Last FYR: Three actions are ongoing in OU-1/Parcel 9 that have an impact on the protectiveness and are discussed below.

Completion of the OU-1 Enhanced Attenuation Field Demonstration

To better evaluate a transition to MNA, LM conducted the multiyear OU-1 Enhanced Attenuation Field Demonstration to evaluate the use of edible oils to enhance natural attenuation processes. The field demonstration was designed to determine whether discrete treatment zones could be established and sustained to expedite the attenuation of VOCs in the OU-1 groundwater. Injections were performed in 2014 and the field demonstration was completed in 2018. During that time, the P&T system was placed in standby mode to allow development of the structured geochemical treatment zones under natural groundwater flow conditions. Also, during the interim period between the completion of the field demonstration and remedy reevaluation, the P&T system has remained in standby mode so that the current treatment zones are not altered. Routine inspections of the P&T system equipment have been routinely performed and will continue to be performed until a final determination is made regarding a ROD Amendment.

The results of the field demonstration showed that the concentrations and mass of PCE and TCE in OU-1 groundwater decreased, the treatment zones were established and sustained, and it was demonstrated that the plume could be stabilized. These were all objectives of the field study, as discussed in the *Operable Unit 1 Field Demonstration Project Completion Report, Mound, Ohio, Site* (DOE 2020b).

Results from monitoring after the completion of the field demonstration indicate that the concentrations of PCE and TCE continue to decrease, concentrations of *cis*-1,2-dichloroethene (*cis*-1,2-DCE) and vinyl chloride (VC) have remained low, and geochemical and microbial conditions have been sustained that result in the degradation of VOCs in groundwater. Also, the VOC plume has remained stable (not expanding), and concentrations within the plume are low.

Identification of VI Pathway to Future Property Owners

The results of historical data evaluation and several recent investigations conducted in the former OU-1 landfill area of Parcel 9 indicate the presence of several vapor-forming chemicals, namely TCE and VC, at levels that could result in an unacceptable risk if a complete exposure pathway were present. The property is owned by DOE and there are no occupied buildings in the former landfill area.

Amendment of the OU-1/Parcel 9 ROD

Based on the results of the OU-1 Enhanced Attenuation Field Demonstration, LM has proposed to EPA and Ohio EPA to reevaluate the OU-1 groundwater remedy and consider an attenuation-based remedy instead of the current hydraulic containment remedy using a P&T system. LM has prepared a focused Feasibility Study (FS) that provides an update to investigation and demonstration activities and the results of a focused evaluation of remedial alternatives

conducted for OU-1 contaminated groundwater. Data indicate that the VOC plume may achieve MCLs approximately 10 years sooner when compared to the P&T system. LM transmitted the draft *Operable Unit 1 Focused Feasibility Study, Mound, Ohio, Site* (DOE 2019c) on September 30, 2019, to EPA and Ohio EPA for review. Based on regulator comments, LM transmitted a revised draft focused FS on April 1, 2021, to EPA and Ohio EPA for review.

In response to the elevated subsurface soil-gas data from the former OU-1 landfill area, LM has prepared a VI addendum to the focused FS that provides the information necessary to support an informed risk management decision concerning the most appropriate remedy to address vapor-forming chemicals present in the vadose zone in Parcel 9. LM transmitted the draft *Vapor Intrusion Addendum to Operable Unit 1/Parcel 9 Focused Feasibility Study, Mound, Ohio, Site* on April 1, 2021 to EPA and Ohio EPA for review.

4.0 FYR Process

LM began the Mound site FYR process in September 2020 by notifying regulatory agencies, the community, and other interested parties. LM established the review team in consultation with EPA and Ohio EPA, reviewed relevant documents and data, conducted physical inspections, analyzed monitoring data, and developed this fifth FYR report.

The CERCLA FYR team included Brian Zimmerman, LM; Rebecca Cato, Melissa Lutz, and Karen Golden, Legacy Management Support (LMS) contractor; Joyce Massie, LMS contractor team; David Seely, EPA-Region 5; and Brian Nickel, Ohio EPA.

4.1 Community Notification and Involvement

LM placed a public notice of the FYR in the *Dayton Daily News* November 1–3, 2020, that described the review process and advised that the final report would be available on the Mound, Ohio, Site webpage on the LM public website. LM created a CERCLA FYR page (https://www.energy.gov/lm/mound-ohio-site-cercla-five-year-review) including a survey form for the public, on the Mound site webpage. LM also emailed 41 local stakeholders, directing them to the LM public website and inviting them to complete the survey. Two surveys were received by the end of the review period. Copies of the public notices and surveys are included in Appendix A. LM will issue a second public notice when the report is completed and available on the Mound site webpage.

Representatives of the City of Miamisburg and MDC accompanied the review team during 2017, 2018, and 2019 annual IC assessment walkdowns. Because of the COVID-19 restrictions, the 2020 walkdown was conducted by the LMS contractor. The results and photos are included in the 2020 report. The combined IC/FYR physical inspections were performed in January 2021 and the results were presented February 11, 2021. Also, personnel from both organizations and site property owners were contacted during the annual IC assessments.

4.2 Site Inspections

LM conducts annual assessments of the effectiveness of the Mound site's ICs to determine whether the ICs continue to function as designed, adequate oversight mechanisms are in place to

identify possible violations of ICs, and adequate resources are available to correct or mitigate any problems if violations occur. The O&M Plan provides the specific inspection requirements.

These assessments examine changes that could indicate an IC violation, such as nonindustrial use, unapproved use of groundwater, unapproved soil removal, or unapproved penetration or removal of concrete from special T Building areas. The assessments include physical inspections, discussions with property owners, and records reviews with a checklist that details observations. The checklists are reviewed periodically and revised as necessary. LM asks property owners to complete and return a *Mound Site Landowners – Institutional Controls Compliance Form*, which is included in each annual report. The reports from calendar years 2017–2021 include the following:

- *2017 Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio* (DOE 2017a)
- *2018 Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio* (DOE 2018a)
- *2019 Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio* (DOE 2019a)
- *2020 Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio, Addendum October 2020* (DOE 2020a)
- *2021 Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio* (DOE 2021)

No issues or recommendations were identified from the annual IC assessments.

The LMS contractor performed the 2021 FYR physical inspection in conjunction with the 2021 annual site IC assessment walkdown. As previously noted, due to COVID-19 restrictions, the regulators and other stakeholders did not participate, but were shown the walkdown photos during a February 11, 2021, presentation. All inspection activities since the last FYR were performed in accordance with the O&M Plan. EPA may conduct a physical site inspection when COVID-19 restrictions have been lifted.

The site physical inspections covered the entire site to review and verify that the remedy components are being regularly maintained. More details from the inspections are included in the checklist in Appendix B. An aerial photograph from March 3, 2021, and photographs from the combined IC Assessment/FYR physical inspections performed January 11–27, 2021, are contained in Appendix C.

The 2021 annual IC assessment determined that the ICs continue to function as designed, adequate oversight mechanisms are in place to identify possible violations of ICs, and adequate resources are available to correct or mitigate any problems if violations occur. There were no recommendations from this assessment.

The combined IC/FYR physical inspections also determined that the groundwater remedy components are being regularly maintained. These components include wells, seeps locations, and the air stripper housed in Building 300 that treats the groundwater extracted in the OU-1 area.

4.3 Interviews

The FYR review team participated in interviews conducted for the annual IC assessment and conducted other interviews with O&M managers from its LMS contractor. These interviews are included with the site inspection checklists (Appendix B).

4.4 Data Review

Discussed in the following sections are the sampling results and data analysis performed in support of the portions of the remedies to address groundwater for the following areas:

- Phase I—MNA groundwater remedy
- Parcels 6, 7, and 8—MNA groundwater remedy
- OU-1—P&T operation and OU-1 Enhanced Attenuation Field Demonstration monitoring and subsequent interim groundwater monitoring

The monitoring programs are defined in the O&M Plan. The implications of the data regarding the functionality and protectiveness of the remedies are discussed in Sections 5.0 and 7.0, respectively.

Data used for these discussions were from the following reports covering calendar years 2016–2020:

- *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site*, Calendar *Year 2016* (DOE 2017b)
- *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2017* (DOE 2018b)
- *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2018* (DOE 2019e)
- *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2019* (DOE 2020c)
- *Sitewide Groundwater Monitoring Report, Mound, Ohio, Site, Calendar Year 2020* (DOE forthcoming)
- *Operable Unit 1 Field Demonstration Project Completion Report, Mound, Ohio, Site* (DOE 2020b)
- Environmental Restoration Monthly Progress Reports for the Mound, Ohio, Site covering 2016–2020

Current and historical water quality and water-level data for existing wells can be found on the LM Geospatial Environmental Monitoring System (GEMS) website: https://gems.lm.doe.gov/. Photographs, maps, and physical features can also be viewed on the GEMS website.

4.4.1 Phase I

Groundwater in Phase I is monitored for TCE and its degradation products to verify that the concentration of TCE is decreasing by natural attenuation to concentrations less than the MCL. This groundwater monitoring program was established to ensure that the BVA is not negatively affected by TCE-contaminated groundwater within the Phase I bedrock aquifer system. The RAOs are:

- Protecting the BVA by verifying that the concentrations of TCE in the vicinity of bedrock wells 0411 and 0443 and seep 0617 are decreasing and that TCE is not impacting the BVA.
- Demonstrating the reduction of TCE to concentrations below the MCL in wells 0411 and 0443 and seep 0617.

Under the Phase I MNA monitoring program, samples are collected from selected wells and a seep (Figure 3) and analyzed for VOCs as outlined in Table 6. Bedrock wells 0411 and 0443 are monitored to provide spatial coverage of flow paths in the immediate vicinity of the well 0411 area. Bedrock wells 0353, 0444, and 0445 and seep 0617 are monitored to provide spatial coverage of flow paths downgradient of the well 0411 area. In conjunction with the bedrock wells, well P064 is monitored to assess potential movement of TCE from the bedrock system to the BVA. Sampling of wells 0400, 0402, and P033 was discontinued in 2017.

Table 6. Remedy (MNA) Monitoring for Phase I

Monitoring Location	Area	Sampling Frequency	Parameters
Well 0411	Well 0411 Area	Semiannual (First and third quarter of each calendar year)	TCE DCE VC
Well 0443			
Well 0353	Downgradient Bedrock Monitoring		
Well 0444			
Well 0445			
Seep 0617			
Well 0400	BVA Monitoring		
Well 0402			
Well P033			
Well P064			

Notes:
Samples are collected and analyzed as outlined in the O&M Plan.
Sampling frequency for the MNA program was reduced to semiannually in 2007 with the approval of the Mound Core Team.
Sampling of wells 0400, 0402, and P033 was discontinued in 2017 with the approval of the Mound Core Team.

Abbreviations:
BVA = Buried Valley Aquifer
DCE = dichloroethene

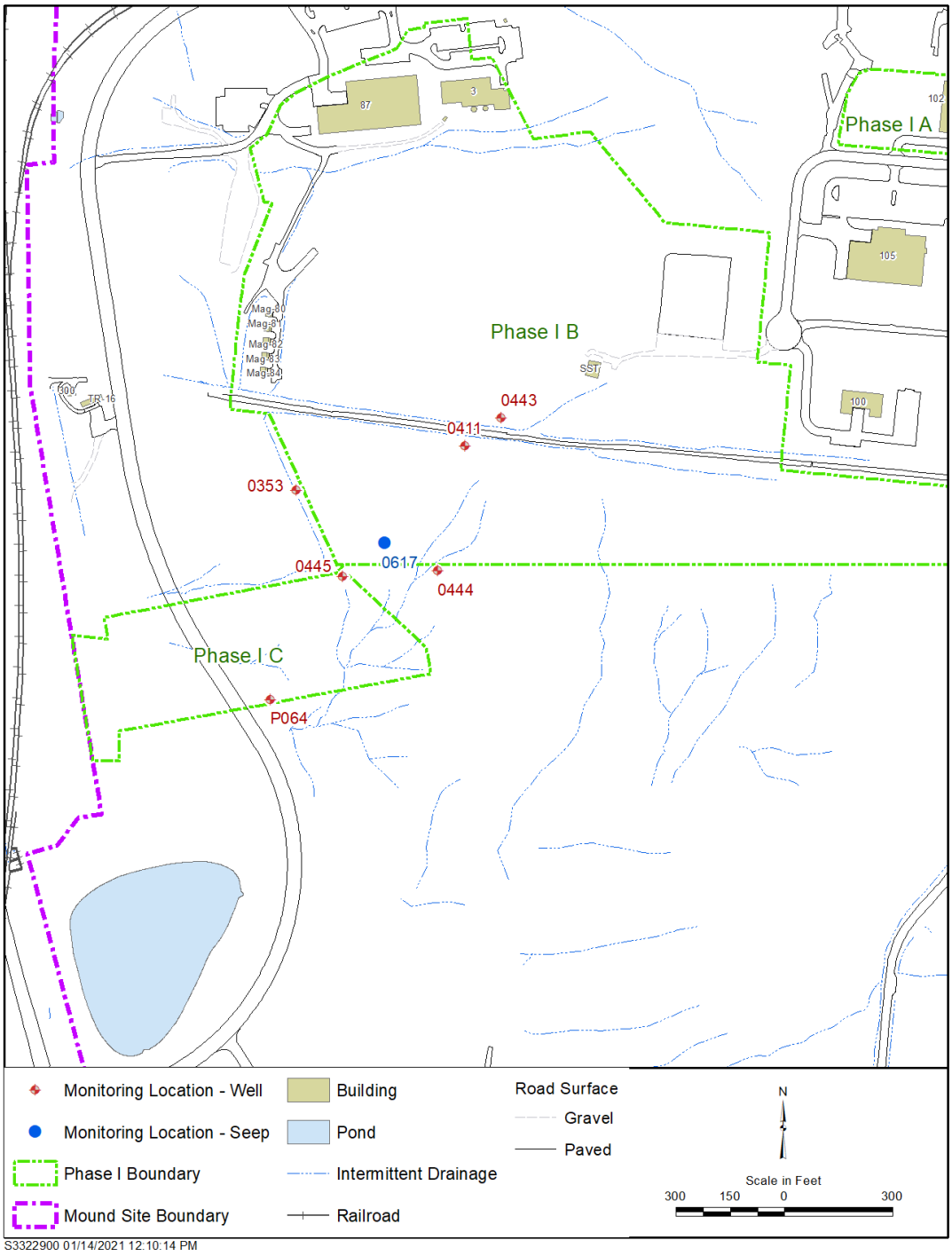

Figure 3. Phase I MNA Remedy Monitoring Locations

Monitoring results since the last FYR continue to show low levels of TCE and *cis*-1,2-DCE, a TCE degradation product, in source area wells 0411 and 0443 and seep 0617. Concentrations of TCE at these locations continue to exceed the MCL of 5 micrograms per liter (µg/L). All VOC concentrations were below the applicable trigger levels. Sporadic low concentrations of *trans*-1,2-dichloroethene (*trans*-1,2-DCE) have been reported in wells 0411 and 0443. No detectable concentrations of VC were reported at the two source wells and the seep monitoring

locations. No detectable concentrations of *cis*-1,2-DCE, *trans*-1,2-DCE, or VC were reported in the remainder of the bedrock wells.

Downgradient BVA monitoring well P064 had low concentrations of PCE, TCE, and *cis*-1,2-DCE that were below the MCL but indicated slight impact attributable to VOCs originating from the Phase I area. Wells 0400, 0402, and P033 did not indicate impact attributable to VOCs originating from the Phase I area; however, it was determined that detections of VOCs in these wells were attributable to VOC impact in OU-1.

TCE concentrations in well 0411 (Figure 4) have decreased since monitoring began in 1999. The concentrations of TCE in this well have varied from 9 to 15 µg/L; however, in 2016 concentrations began to stabilize around 10 µg/L. Concentrations of TCE in well 0443 and seep 0617 have varied since monitoring of these locations started in 2002. Concentrations of TCE in well 0443 had been consistently greater than the MCL since 2010. The time-concentration plots for well 0443 and seep 0617 indicate that concentrations vary and are lower than those in well 0411.

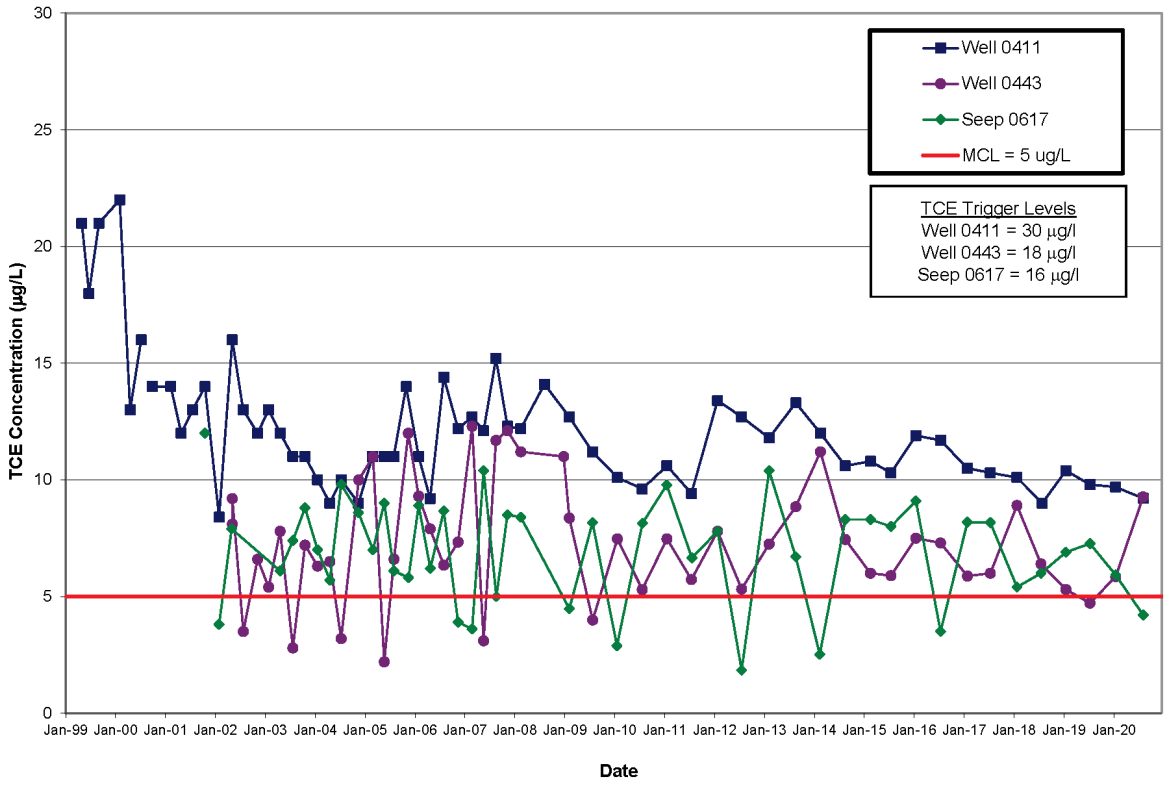

Figure 4. TCE Concentrations in Phase I, 1999–2020

The concentrations of *cis*-1,2-DCE in groundwater (Figure 5) continue to be varied. Concentrations greater than the reporting limit of 1 µg/L have consistently been reported in well 0411 and seep 0617. Historically, concentrations of *cis*-1,2-DCE in well 0411 were generally greater than those measured in seep 0617; however, over the past few years, the concentrations in seep 0617 have been higher than or similar concentrations in well 0411. Estimated detections lower than 1 µg/L have been reported in well 0443 since 2009. None of the locations had concentrations of *cis*-1,2-DCE that exceeded the MCL of 70 µg/L.

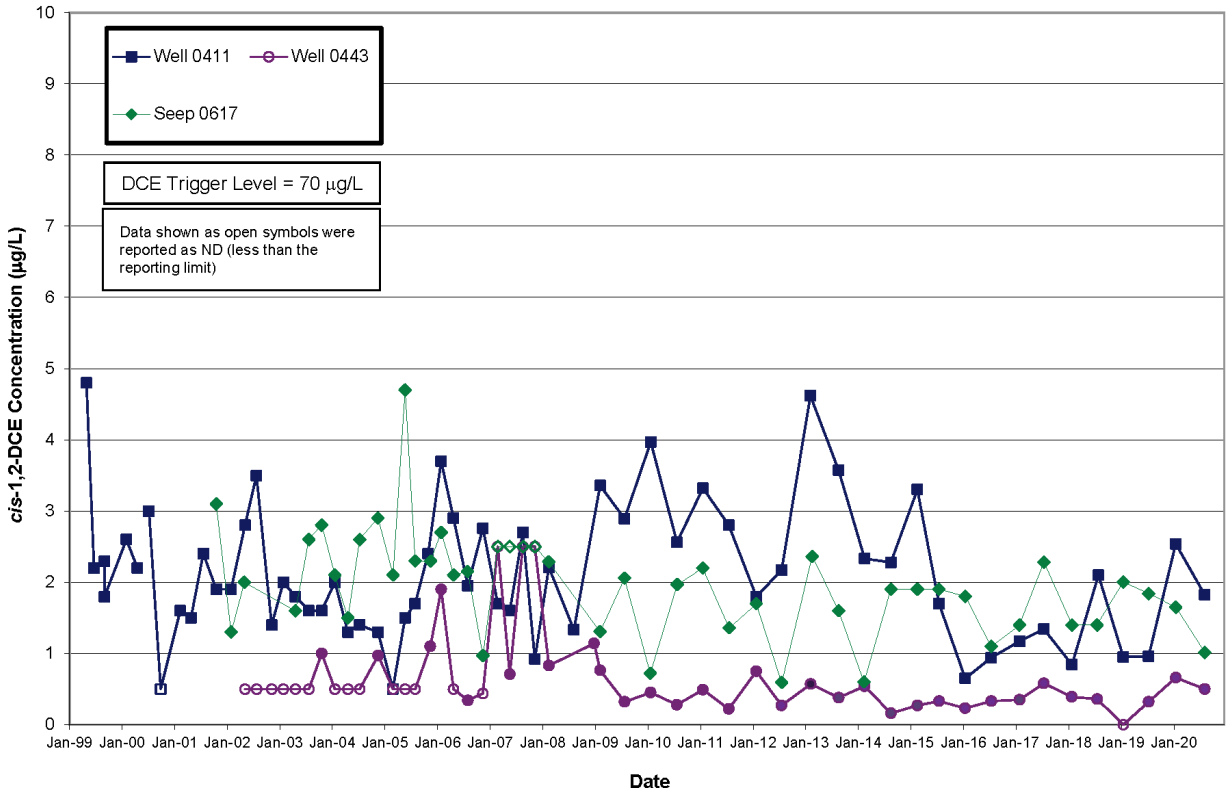

Figure 5. cis-*1,2-DCE Concentrations in Phase I, 1999–2020*

Mann-Kendall trend analysis was performed using data collected since 1999 for wells 0411 and 0443 and seep 0617 to determine if there were trends in the data and identify if the trends are increasing or decreasing. The statistical analysis indicates downward trends for TCE in well 0411 and for *cis*-1,2-DCE in well 0443 and seep 0617 (Table 7). Trend analysis for well P064 was performed using data collected since its installation in 2017 and indicates a downward trend for TCE. Trend analysis was not performed for the remainder of the wells because results consistently showed nondetects or sporadic detections.

Table 7. Trend Analysis Results for TCE and cis-*1,2-DCE in Phase I*

Location	Analyte	Trend
Well 0411	TCE	**Down**
Well 0443		None
Seep 0617		None
Well P064		**Down**
Well 0411	*cis*-1,2-DCE	None
Well 0443		**Down**
Seep 0617		**Down**
Well P064		None

The Theil-Sen test was used to estimate the magnitude of the downward trend in TCE concentrations in well 0411 indicated by the Mann-Kendall analysis. The slope calculated for the trend line using the Theil-Sen test suggests that the MCL may be reached by 2029. The remainder of the locations were less than the MCL or no trend was present; therefore, no time frames are estimated.

4.4.2 Parcels 6, 7, and 8

Groundwater in Parcels 6, 7, and 8 is monitored for TCE and its degradation products to verify that the downgradient BVA is not affected and concentrations are decreasing. Table 8 provides a summary of the monitoring locations shown in Figure 6 as specified in the O&M Plan. The RAOs include the following:

- Protect the downgradient BVA by verifying that TCE concentrations in the vicinity of wells 0315 and 0347 are decreasing and not impacting the BVA
- Monitor the reduction of TCE concentrations to determine if they fall below the MCL in wells 0315 and 0347 and to verify the hypothesis that natural decomposition of TCE will result in concentrations below the MCL over time
- Monitor the reduction of TCE and PCE concentrations and tritium activity to determine if those parameters fall below the MCLs in seeps 0601, 0602, 0605, 0606, and 0607 and to verify the hypothesis that—with the removal of the TCE, PCE, and tritium sources—natural decomposition of TCE and PCE and decay of tritium will result in concentrations below the MCL over time

Table 8. Monitoring for Parcels 6, 7, and 8 Area

Monitoring Location	Area	VOC	Tritium
Well 0315	Source wells	X	
Well 0347		X	
Well 0118	Downgradient BVA monitoring	X	X
Well 0124		X	
Well 0126		X	
Well 0138		X	X
Well 0301		X	X
Well 0346		X	X
Well 0379		X	X
Well 0386		X	
Well 0387		X	
Well 0389		X	
Well 0392		X	
Seep 0601	Main Hill seeps	X	X
Seep 0602		X	X
Seep 0605		X	X
Seep 0606		X	X
Seep 0607		X	X

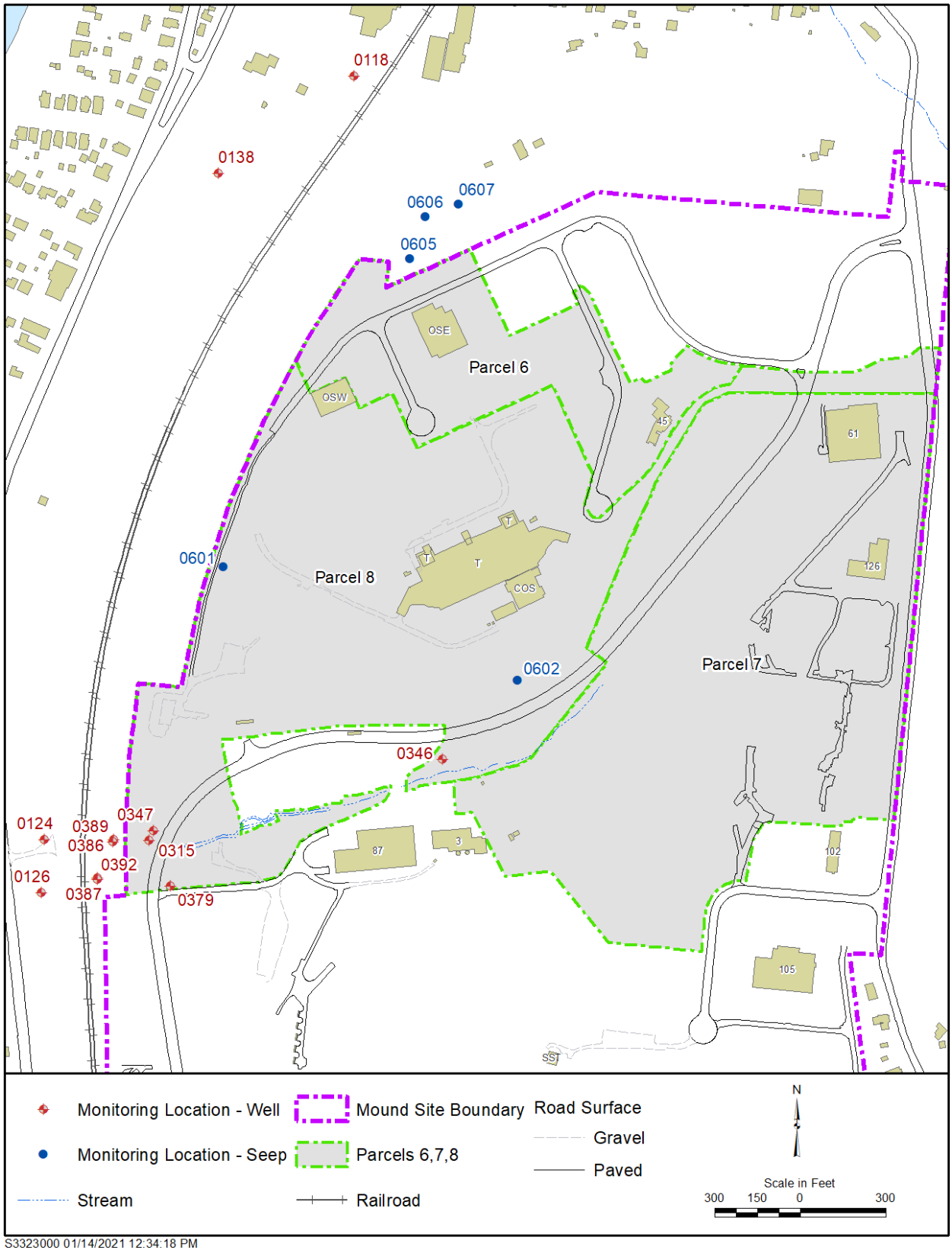

Figure 6. Parcels 6, 7, and 8 Groundwater and Seep Monitoring Locations

4.4.2.1 VOCs

Monitoring results since the last FYR indicated that concentrations of TCE in all Main Hill seeps continued to exceed the MCL. However, no locations had concentrations that exceeded the trigger level of 150 µg/L (established for seep 0605). The highest concentrations of TCE continued to be measured in seep 0602, which is onsite. Seep 0602 was dry several times during the reporting period of 2016–2020 and was not sampled during some quarters. PCE concentrations continued to exceed the MCL of 5 µg/L in seep 0601; however, PCE concentrations at this location did not exceed the trigger level of 75 µg/L. Low-level detections of PCE were reported periodically in seeps 0602, 0605, 0606 and 0607. *cis*-1,2-DCE was reported in seeps 0602, 0605, and 0607; seep 0602 had the highest concentrations. Estimated detections of *cis*-1,2-DCE (less than 1 µg/L) were reported in remainder of the seeps. Estimated detections of *trans*-1,2-DCE (less than 1 µg/L) were reported periodically in seep 0602 and 0605. No VC was detected in the seeps.

A graph of TCE concentrations measured in the seeps since 2012 (Figure 7) shows that the highest concentrations of TCE were measured in seeps 0602 and 0605. After the completion of site improvements and the closure of the tritium capture pits on the Main Hill in 2011, VOC concentrations have been less variable and decreasing. Data from the past few years show that elevated concentrations of TCE only periodically occur in seep 0602.

Seep 0601 is the only location where PCE is routinely reported and PCE concentrations in this seep (Figure 8) are similar to those measured before remediation on the Main Hill. Estimated PCE concentrations less than 1 µg/L were reported in seeps 0605 and 0607 during 2020.

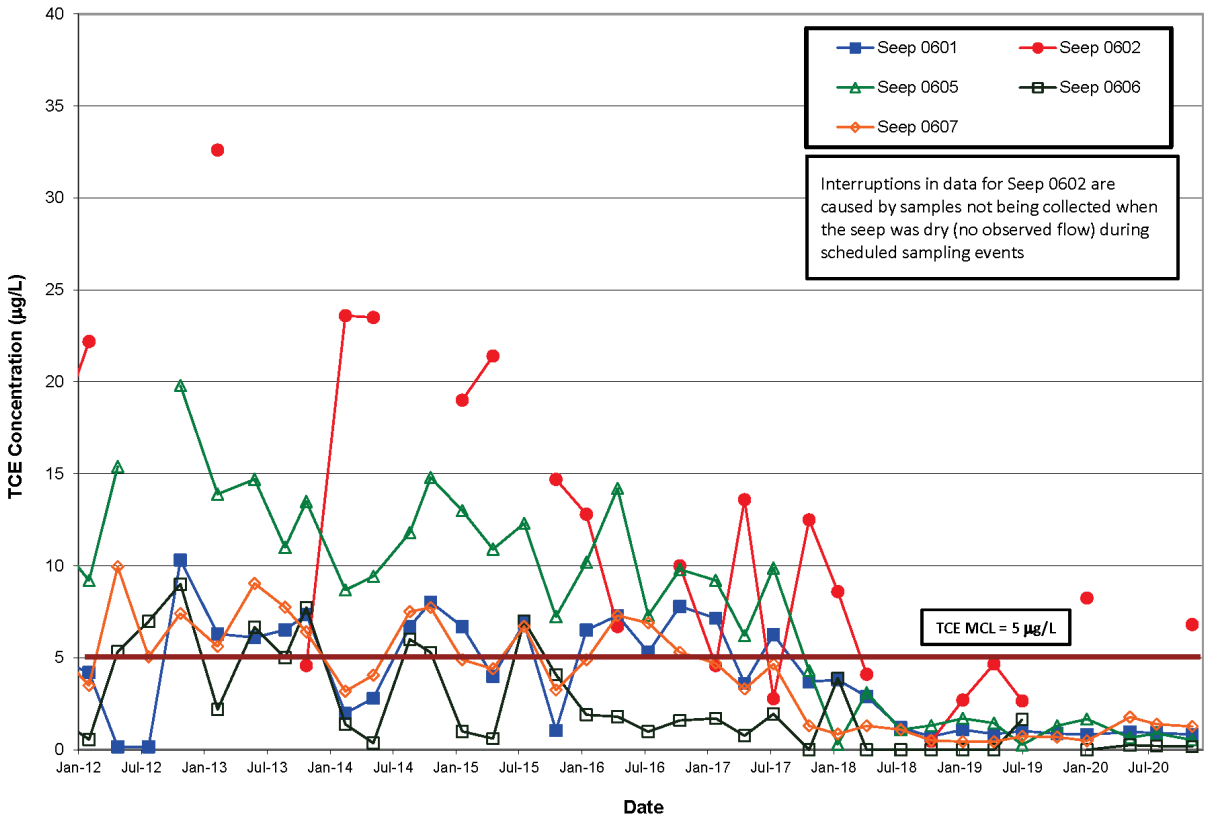

Figure 7. TCE Concentrations in Parcels 6, 7, and 8 Main Hill Seeps

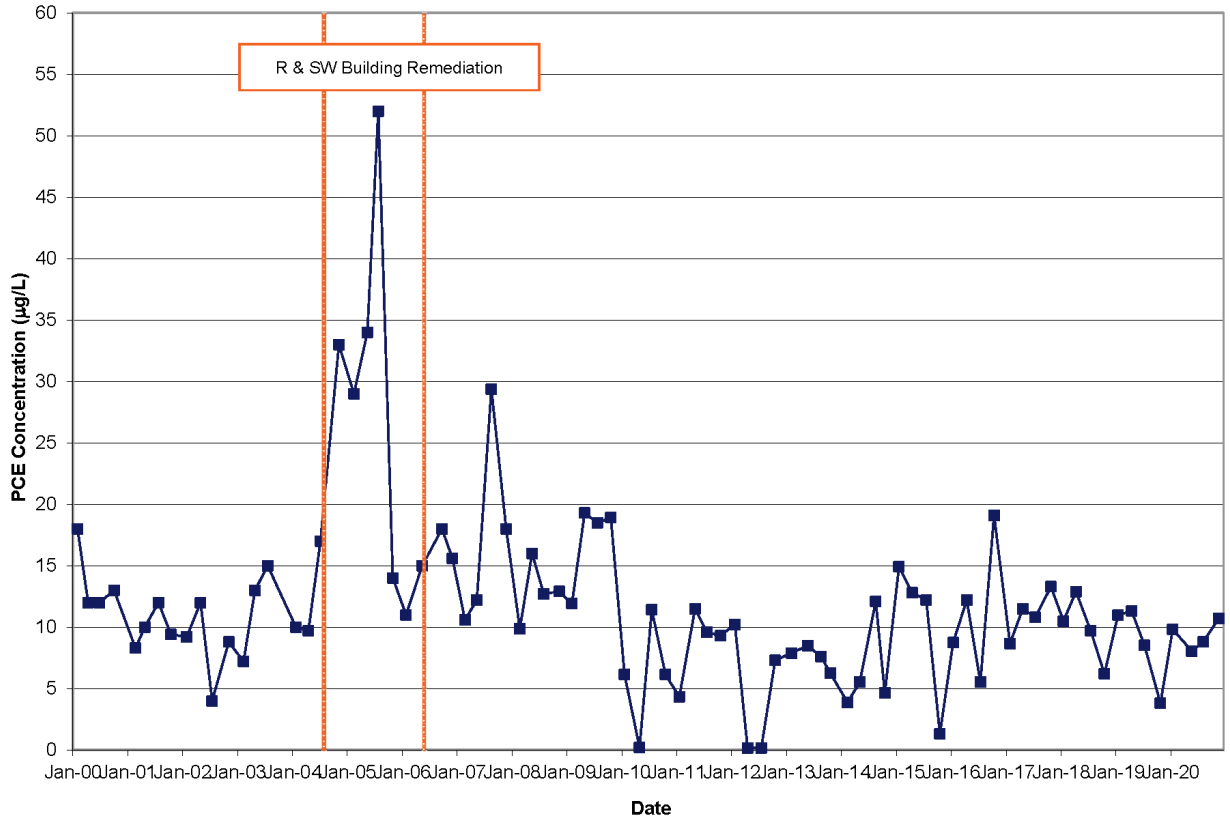

Figure 8. PCE Concentrations in Seep 0601 (Parcels 6, 7, and 8)

Monitoring results since the last FYR continue to show TCE in wells 0315, 0347, 0379, and 0386; the highest concentrations are detected in wells 0315 and 0347 (source area wells), where concentrations also exceed the MCL. The concentrations of TCE reported in wells 0315 and 0347 were less than the trigger level of 30 µg/L established for these source area wells, except for one time (third quarter 2012) in well 0347. Well 0386 is downgradient of wells 0315 and 0347 just outside the Mound site boundary. Well 0379 is onsite within the tributary valley, where wells 0315 and 0347 are also located. Estimated detections of TCE were reported in wells 0387, 0389, and 0392. No detectable concentrations of TCE were measured in the other wells. All TCE concentrations were below applicable trigger levels.

Estimated detections of PCE less than 1 µg/L were reported in wells 0126, 0379, 0386, 0387, 0389, and 0392. All of these wells are located where the tributary valley enters into the BVA. No trigger levels for PCE have been set for these locations. No detectable concentrations of *cis*-1,2-DCE, *trans*-1,2-DCE, or VC were reported in any of the wells monitored as part of this program.

TCE data from the Main Hill area indicate that the highest concentrations were measured in groundwater in well 0347. Historically, concentrations of TCE were higher in the seeps than in the groundwater monitoring wells; however, starting in 2018, it was observed that the concentrations of TCE in wells 0315 and 0347 were higher than those measured in the upgradient seeps.

A graph of TCE concentrations measured in select wells shows that concentrations in wells 0315 and 0347 have consistently been greater than the MCL of 5 µg/L (Figure 9), although TCE concentrations in well 0315 have generally been lower than the MCL in the past 5 years and reported as estimated values (less than 1 µg/L) for all 2020 sampling events. Neither of the source wells exceeded the trigger level of 30 µg/L during the 2016 to 2020 review period. The concentrations of TCE in the downgradient wells have been below the MCL since 2000 and reported at or below 1 µg/L since 2018. The pattern in TCE concentrations in wells 0315 and 0347 has been similar since 2012. The concentrations in well 0347 have continued to be higher and have greater changes (increases and decreases) compared to those in well 0315. An overall decrease in TCE concentrations can be observed beginning at the same time. It is likely that surface water influences noted in previous reports (DOE 2014a; DOE 2014b) have been reduced or eliminated and that more recent data reflect TCE concentrations in groundwater not influenced by infiltration of surface water through the exposed tritium capture pits.

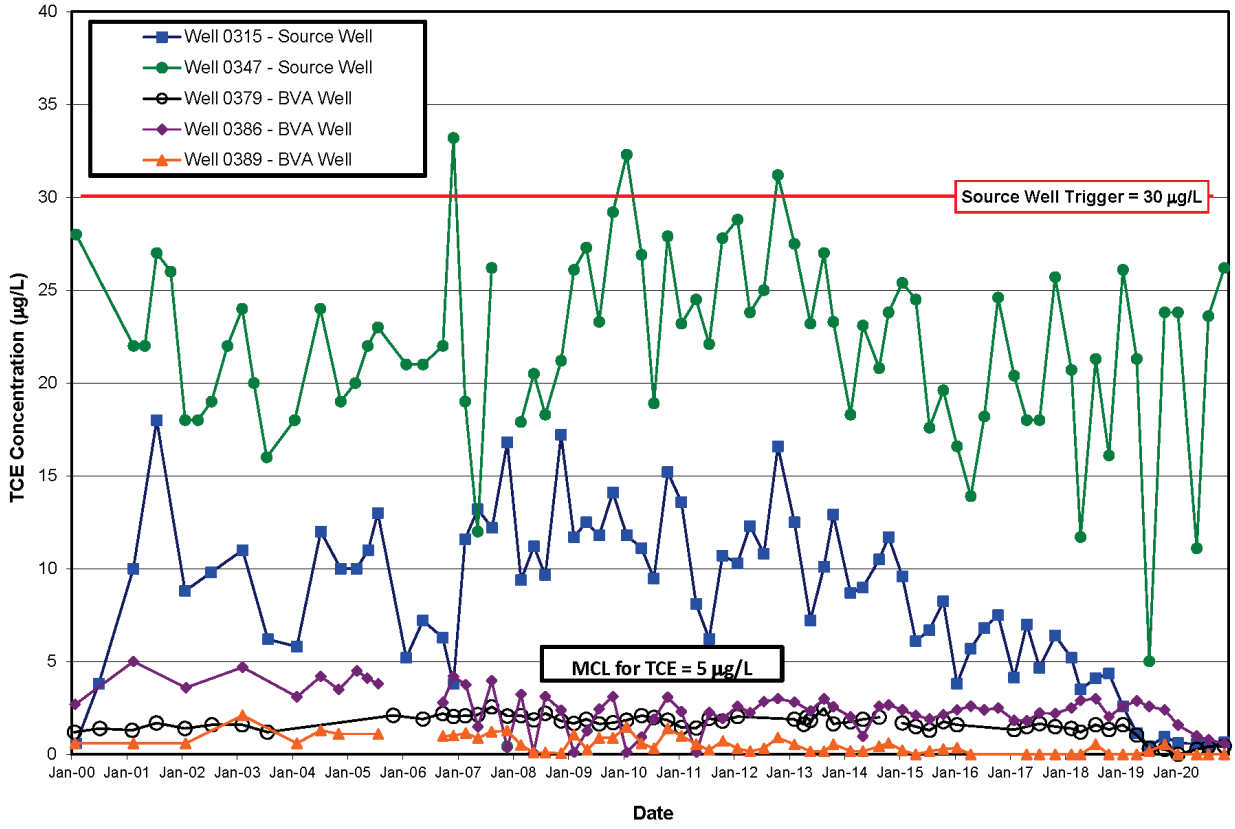

Figure 9. TCE Concentrations in Parcels 6, 7, and 8 Groundwater

Mann-Kendall trend analysis was performed using TCE data collected since 2012 to determine if there were trends in the data and identify if the trends are upward or downward. The statistical analysis indicates downward trends for all the seeps and wells (Table 9). Concentrations of PCE in seep 0601 were evaluated for a trend in PCE concentrations, and a no statistically significant trend was indicated (Table 9). Data from seeps 0602 and 0605 were evaluated for trends in *cis*-1,2-DCE concentrations (Table 9), and downward trends were determined by the nonparametric Mann-Kendall test for both seeps. The Theil-Sen test was used to estimate the magnitude of the slope data collected for 2012–2020 time frame for the well 0347. The slope of

the trendline suggests that the MCL may be reached by 2040. Trend analysis was not performed on data from the remainder of the wells because results consistently showed nondetects or sporadic estimated detections.

Table 9. Trend Analysis Results for VOCs in Parcels 6, 7 and 8

Location	Trend
TCE	
Seep 0601	**Down**
Seep 0602	**Down**
Seep 0605	**Down**
Seep 0606	**Down**
Seep 0607	**Down**
Well 0315	**Down**
Well 0347	**Down**
Well 0386	**Down**
Well 0389	**Down**
PCE	
Seep 0601	None
***cis*-1,2-DCE**	
Seep 0602	**Down**
Seep 0605	**Down**

4.4.2.2 Tritium

Data collected since the last FYR indicates that tritium levels in the Main Hill seeps continued to be detectable and were higher than those in the downgradient groundwater wells. The highest tritium activity was observed in seep 0601, which is onsite. Seep 0601 is the only location that exceeded the MCL of 20 nanocuries per liter (nCi/L) during the 2016–2020 period. The levels of tritium in seep 0601 have been below the MCL since 2017. None of the seeps had tritium levels that exceeded the trigger level of 1500 nCi/L.

Detectable tritium continued to be measured in well 0347. The remaining wells had tritium levels less than 1.1 nCi/L, which is similar to the background level of 0.77 nCi/L (DOE 1996). None of the groundwater wells had tritium activity levels that exceeded the MCL of 20 nCi/L.

Tritium levels in the seeps were highest during remediation activities on the Main Hill (2004−2006). Tritium data collected after building demolition and soil removal indicate decreasing levels in all of the seeps (Figure 10). The decrease in tritium levels in postremediation data supports that the majority of the source was removed from the Main Hill area and that, with continued flushing, levels are expected to continue to decline. Starting in 2009, the tritium levels in all seeps—except seep 0601—were lower than the MCL of 20 nCi/L. The levels of tritium in seep 0601 have been below the MCL since 2017.

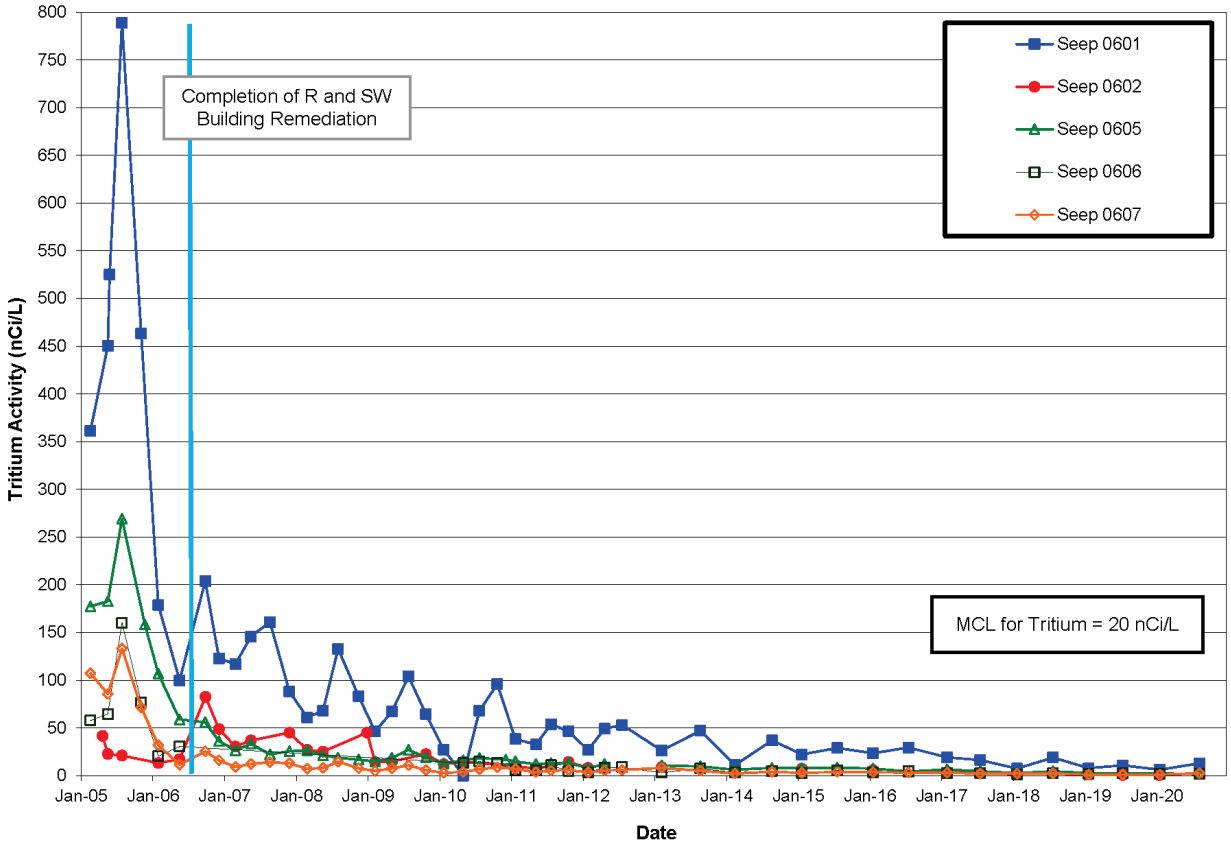

Figure 10. Tritium Activity in Parcels 6, 7, and 8 Main Hill Seeps

A graph of tritium levels in downgradient wells (Figure 11) illustrates that groundwater impact in the wells lagged behind impact expressed in the seeps. Groundwater impact increased near the end of remediation activities on the Main Hill; impact in the seeps occurred as remediation activities were being performed and began to decrease as activities were completed. The tritium levels in the wells also responded quickly to remediation activities. In general, the tritium levels in the wells have leveled off and are similar to background (0.77 nCi/L). Well 0347 historically had the highest levels of tritium, and starting in 2016, the levels were like those measured in the other wells. All tritium levels in the monitoring wells were below the MCL of 20 nCi/L.

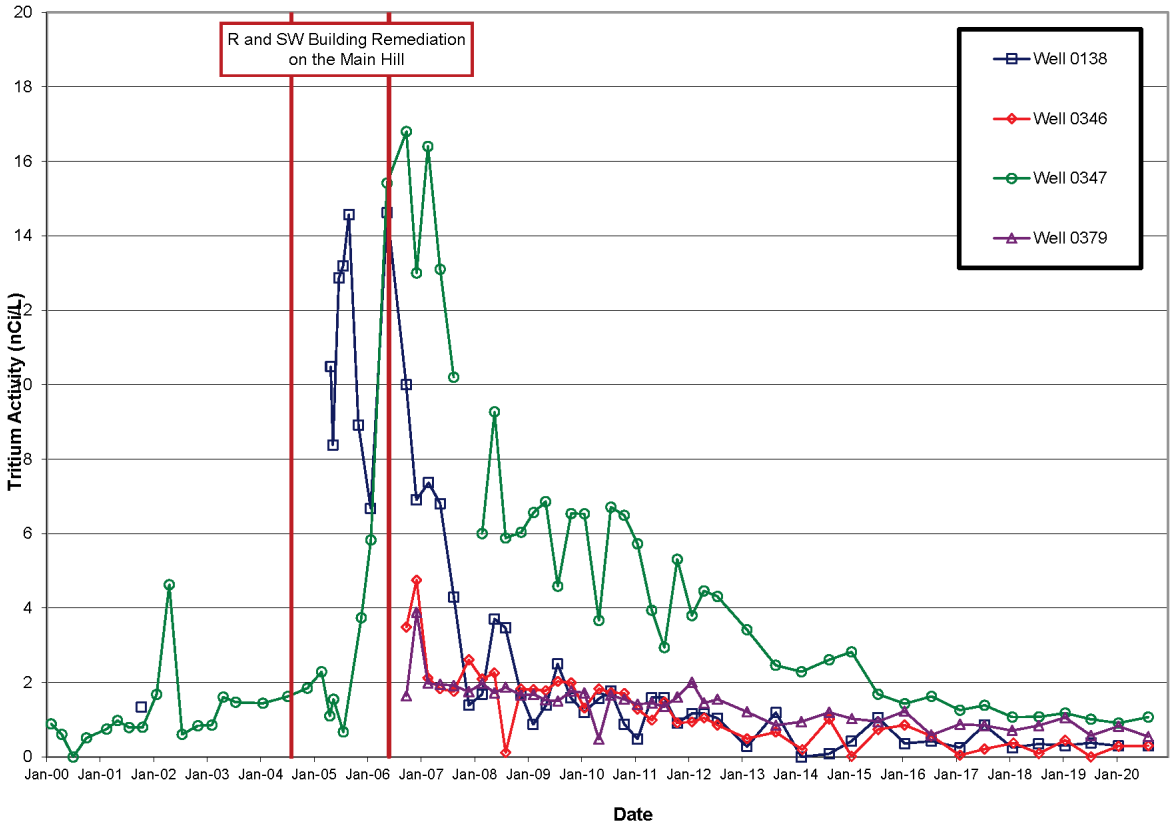

Figure 11. Tritium Activity in Parcels 6, 7, and 8, Wells 0138, 0346, 0347, and 0379

Trend analysis for tritium data collected since 2012 was performed for all seeps and wells where detectable levels have been consistently measured. The results of the trend analysis (Table 10) showed that downward trends in activity were observed in all seeps and wells.

Table 10. Summary of Trend Analysis Results for Tritium in the Main Hill Seeps and Downgradient Wells

Location	Trend
Seeps	
Seep 0601	**Down**
Seep 0602	**Down**
Seep 0605	**Down**
Seep 0606	**Down**
Seep 0607	**Down**
Wells	
Well 0138	**Down**
Well 0346	**Down**
Well 0347	**Down**
Well 0379	**Down**

4.4.3 Operable Unit 1

To better evaluate a transition to MNA, LM conducted a multiyear field demonstration to evaluate the use of edible oils to enhance natural attenuation processes. The project was known as the OU-1 Enhanced Attenuation Field Demonstration, as described in the *Field Demonstration Work Plan for Using Edible Oils to Achieve Enhanced Attenuation of cVOCs and a Groundwater Exit Strategy for the OU-1 Area, Mound, Ohio* (DOE 2014a). It was designed to determine whether discrete treatment zones could be established to expedite the attenuation of VOCs in the OU-1 groundwater.

Injections were completed in 2014 for all wells, and the P&T system was shut off and put into standby mode on September 15, 2014. The field demonstration completed the fourth (final) year of postdeployment monitoring in August 2018. During this time, the P&T system was placed in a standby mode to allow development of the structured geochemical treatment zones under natural groundwater flow conditions. The P&T system was routinely inspected to ensure it remained operational if the need arose.

A large-scale dewatering project was started southwest of the Mound site in February 2016 and was concluded in early September 2016. The effects of the dewatering were evaluated throughout years 2–4 and is documented in the annual status reports and the project completion report for the OU-1 Enhanced Attenuation Field Demonstration (DOE 2017d, DOE 2018c, and DOE 2020b). A decline in the water levels in OU-1 was observed starting in May 2016, resulting from increased withdrawal rates at the dewatering project and a regional drought. The groundwater table in the OU-1 area dropped about 4–6 feet between May and September 2016, and the differences between the groundwater elevations between the northern and southern wells were larger than typical. While the offsite dewatering was ongoing, the gradient across OU-1 increased to about 3 times the typical gradient of 0.002 feet per foot. After the dewatering was concluded at the offsite project, the gradient measured in OU-1 returned to normal.
By August 2016, some lateral spreading of the chlorinated volatile organic compound (cVOC) plume was observed in the western and southern part of OU-1 (DOE 2017). Low levels of PCE and TCE were present throughout the OU-1 area; however, any exceedance of MCLs remained within the treatment zones. The occurrence of *cis*-1,2-DCE and VC (daughter products of PCE and TCE) was observed in several downgradient wells.

The observed stability of concentrations (below MCLs) in the sentinel wells (during the period of lower than typical groundwater elevations and increased hydraulic gradients caused by downgradient dewatering operations and regional drought conditions) suggests that the EA remedy effectively attenuated cVOCs throughout the bulk of the cVOC plume in OU-1. Concentrations and concentration trends in the downgradient sentinel wells are an important metric related to potential plume expansion. The concentrations and trends in these wells demonstrated that the cVOC plume was not expanding as a result of the changes observed during the dewatering project. During 2016, the observed stability of concentrations, and measured concentrations below MCLs in the sentinel wells during the period of downgradient dewatering operations, suggest that EA was effectively attenuating cVOCs throughout the bulk of the cVOC plume in OU-1 (DOE 2020b).

Following the restabilization of the water table after the completion of the dewatering project in late 2016, the results for microbial sampling indicated that the overall microbial community was

relatively stable (or recovered) and that the structured geochemical zones remained in place. The total eubacteria count measured at the end of the field demonstration were similar to those that were measured during the second year prior to the transient changes resulting from the dewatering events (DOE 2020b).

On February 13, 2019, the Core Team issued the *Mound Site Core Team Agreement for Operable Unit 1 (OU-1) Monitoring for Interim Period After Enhanced Attenuation Demonstration on February 13, 2019* (DOE 2019b). This memorandum documents the monitoring requirements during the interim period between the conclusion of the OU-1 Enhanced Attenuation Field Demonstration and the regulatory approval of any OU-1 remedy change. During the interim period, the P&T system will remain in standby mode so that the current treatment zones are not altered. The decision not to immediately restart the P&T system after the demonstration project was based upon the data collected during the demonstration project indicating that enhanced attenuation may be a viable remedy, as well as the stated intention not to alter the current treatment zones. Monitoring will continue as discussed below. Routine inspections of the P&T system equipment will continue to be performed as outlined in *OU-1 Pump-and-Treat System Operation and Maintenance Procedure, Mound, Ohio, Site* (DOE 2019d) until a remedy reevaluation process has been completed.

The monitoring program implemented during this interim period includes groundwater sampling, microbial sampling, and groundwater elevation measurements. Monitoring is performed as outlined in the *OU-1 Enhanced Attenuation Field Demonstration Sampling and Analysis Plan, Mound, Ohio, Site* (DOE 2014b) with some reduction from the original monitoring program performed during the field demonstration. The program has been modified to focus on the best indicators of the microbial community and the geochemistry of the aquifer as well as the concentrations of PCE, TCE, and daughter products. Data generated from this sampling will be:

- Evaluated for the continued attenuation of PCE, TCE, and daughter products.
- Evaluated to ensure that the VOC plume shrinks or remains stable.

Under the interim monitoring program, samples are collected from selected wells (Figure 12) and analyzed as outlined in Table 11. Groundwater samples are collected quarterly and microbial samples are collected annually from wells 0419, P031, P056, P058, P060, and P061.

Table 11. OU-1 Interim Monitoring Program

Category	Well IDs	Analytes
Treatment zone	0410 0419 0451 P054 P056 P059 P060	cVOCs Indicator/field parameters Anions Ammonia Metals Light hydrocarbons
Upgradient/lateral area	0379 0416 0422	
Interior impact area	0418 P057 P058	
Downgradient/sentinel	0402 P031 P061 P062 P063	
Other wells	0305 0417 0423 0424 0425 0452 P015 P027 P053	

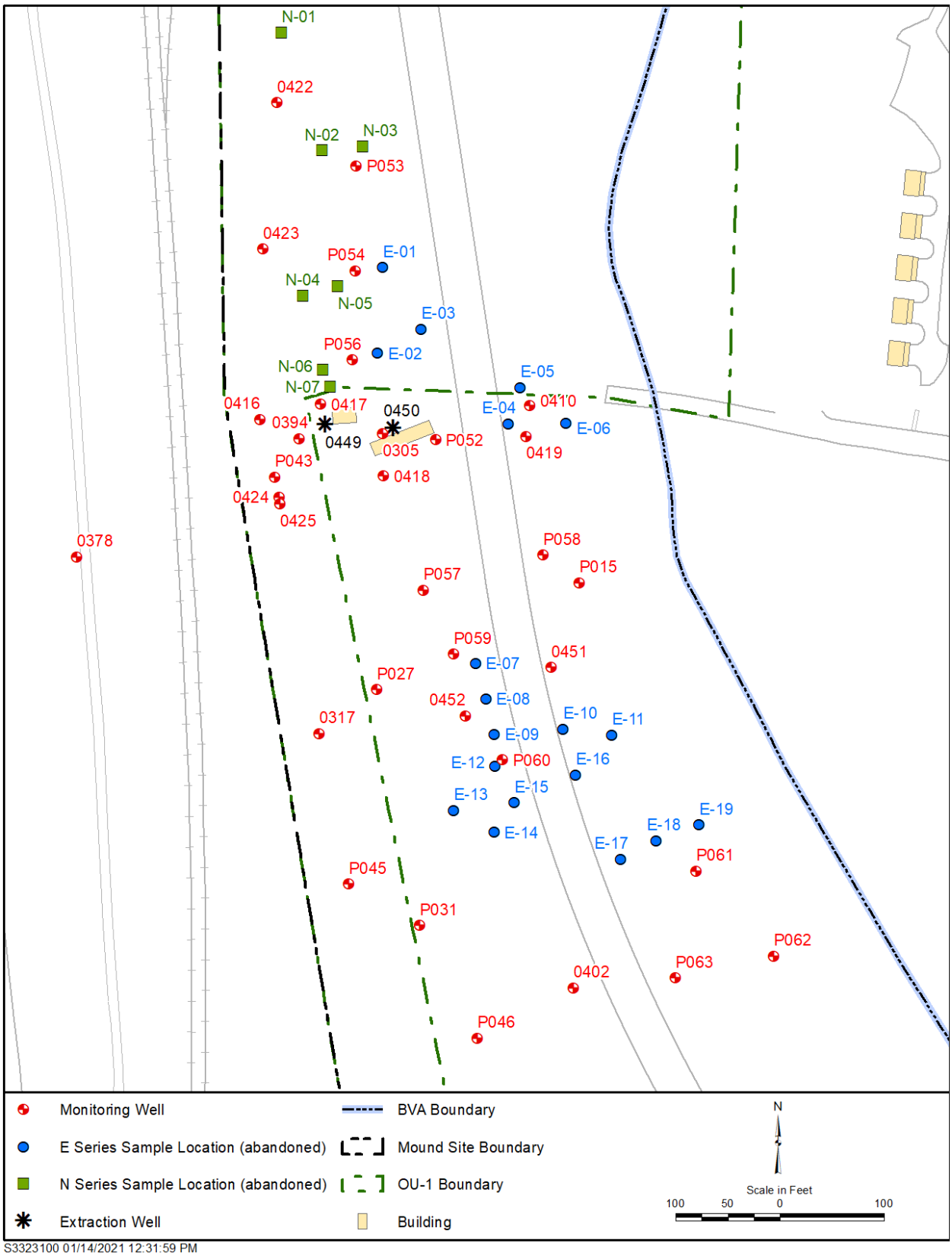

Figure 12. OU-1 Groundwater Monitoring Locations

As outlined in the Core Team agreement regarding interim monitoring for OU-1, data will continue to be evaluated for the lines of evidence of EA outlined in Section 4.1 of the *Field Demonstration Work Plan for Using Edible Oils to Achieve Enhanced Attenuation of cVOCs and a Groundwater Exit Strategy for the OU-1 Area, Mound, Ohio* (DOE 2014a), which is modeled after those outlined in the *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (OSWER 9200.4-17P) (EPA 1999). These lines are:

- First Line of Evidence: Historical groundwater data that demonstrate a clear and meaningful trend of decreasing contaminant mass or concentration over time and the presence of degradation (daughter) products at appropriate monitoring points. This typically includes graphical techniques using the cVOC data and statistical tests, such as the Mann-Kendall test.
- Second Line of Evidence: Hydrogeologic and geochemical data that can be used to demonstrate indirectly the types of natural attenuation processes at the site and the rate at which such processes will reduce contaminant concentrations to required levels. Example analytes include competing electron acceptors (e.g., oxygen, sulfate, and nitrate), helpful electron donors (e.g., hydrocarbons and hydrogen), and diagnostic indicators/byproducts (e.g., methane and iron).
- Third Line of Evidence: Other information, such as data from field or microcosm studies, which directly demonstrate or quantify the occurrence of a particular natural attenuation process and ability to degrade contaminants of concern (COCs).

Table 12 provides a summary of the conclusions reached from the OU-1 Enhanced Attenuation Field Demonstration for each line of evidence.

Table 12. Conclusions Supporting Lines of Evidence of Enhanced Attenuation

Line of Evidence	Conclusions from OU-1 Enhanced Attenuation Field Demonstration
Historical groundwater data that demonstrate a clear and meaningful trend of decreasing contaminant mass or concentration over time and the presence of degradation (daughter) products at appropriate monitoring points.	– PCE and TCE masses decreased significantly over the 4-year period. – Trends in individual well concentrations for the parent products (PCE and TCE) were decreasing in most of the OU-1. – Moment analysis indicates that PCE and TCE mass can be classified as stable or shrinking. – The increase in the mass of *cis*-1,2-DCE and VC demonstrates that significant reductive attenuation processes have developed and are continuing. – Daughter products, *cis*-1,2-DCE and VC have increasing trends in the OU-1 plume, particularly in and near the treatment zones, indicating reductive dechlorination of the parent products. – Moment analysis indicates that the *cis*-1,2-DCE mass can be classified as expanding; however, the generation of daughter products was anticipated. – Moment analysis indicated that the VC mass can be classified as stable.

Table 12. Conclusions Supporting Lines of Evidence of Enhanced Attenuation (continued)

Line of Evidence	Conclusions from OU-1 Enhanced Attenuation Field Demonstration
Hydrogeologic and geochemical data that can be used to demonstrate indirectly the types of natural attenuation processes at the site.	– Prior to the EA deployment, the entire site was predominantly aerobic. Following deployment, predominantly anaerobic zones developed near and downgradient of electron donor injection. – Development of distinct zones within the aquifer with reduced conditions that are variable for reductive dechlorination. – Shifts of geochemistry toward cometabolic (oxidation) conditions in the plume interior and sentinel well areas. – Postdeployment, the patterns of anaerobic and aerobic conditions are consistent with the structured geochemical zone design basis. The sequence of anaerobic and aerobic conditions along the flow path of OU-1 groundwater provides conditions that maximize the degradation opportunities of parent (PCE and TCE) and daughter (DCE and VC) chlorinated ethenes and mitigates the potential for excessive buildup of VC.
Data from field or microcosm studies, which directly demonstrate or quantify the occurrence of a particular natural attenuation process and ability to degrade contaminants of concern.	– All the microbial counts (total bacteria, chlorinated-solvent-reducing bacteria, aerobic cometabolic bacteria, methanogens, and sulfate reducers) increased following the EA deployment and were generally sustained during the field demonstration period. – At the end of the 4-year field demonstration period, the microbial community had adjusted to the decrease in the mass of VOCs, the decrease in PCE and TCE concentrations, and the generation of daughter products (*cis*-1,2-DCE and VC). A general decline in the total eubacteria counts has occurred over the 4-year period; however, at the end of the field demonstration the counts are higher than baseline counts and within acceptable levels to maintain the structured zones. – The wells in the treatment zones showed significant increases in chlorinated-solvent-reducing bacteria that are capable of degrading TCE and PCE. – Side-gradient, intermediate, and downgradient wells have also shown increases in chlorinated-solvent-reducing bacteria counts. – Total eubacteria, sulfate reducers, and methanogens increased in the mid-plume and distal areas and are at levels that indicate aerobic and transitional conditions, consistent with the objectives of structured geochemical zones. – The microbial species and enzymes associated with biodegradation generally require the presence of the target contaminants; the decrease in microbial counts can be attributed to the low concentrations of VOCs present in the groundwater (i.e., the decrease in the mass of cVOCs has resulted in a decrease in the microbial community). The makeup of the microbial species and enzymes in some wells have adapted to account for the decrease in PCE and TCE and presence of *cis*-1,2-DCE and VC.

Abbreviation:
DCE = dichloroethene

Besides decreasing the concentrations and mass of PCE and TCE in OU-1 groundwater and developing and sustaining the treatment zones, demonstrating that the plume could be stabilized was another objective of the field study, as discussed in the *Operable Unit 1 Field Demonstration Project Completion Report, Mound, Ohio, Site* (DOE 2020b). By the end of the field demonstration, moment analysis indicated that plume strength of the parent constituents was decreasing, and the plumes could generally be classified as stable or shrinking. Also, the concentrations and concentration trends in the downgradient sentinel wells were used as a metric related to potential plume expansion. The concentrations and trends in these wells demonstrated that the plume was not expanding.

Data collected under the interim monitoring program, after the completion of the field demonstration, continue to support the lines of evidence listed above with the following:

- The concentrations of PCE and TCE continue to decrease. At the start of the field demonstration, there were 27 exceedances of MCLs. By the end of 2020, the number of MCL exceedances was reduced to four (December 2020b).
- Geochemical data continue to support the presence of both reducing and oxidizing zones, consistent with the design of structured geochemical zones.
- The data indicate a robust microbial community was created after deployment of the emulsified oil and these communities have been maintained.
- The makeup of the microbial species and enzymes in some wells have adapted to account for the decrease in PCE and TCE and the presence of *cis*-1,2-DCE and VC.
- The areal extent of the parent compounds PCE and TCE (Figure 13 and Figure 14) in groundwater remained stable (not expanding) and concentrations within the plume are low.
- *cis*-1,2-DCE (Figure 15) was observed through the OU-1 groundwater plume but remained low.
- VC (Figure 16) is measured within the treatment zones.

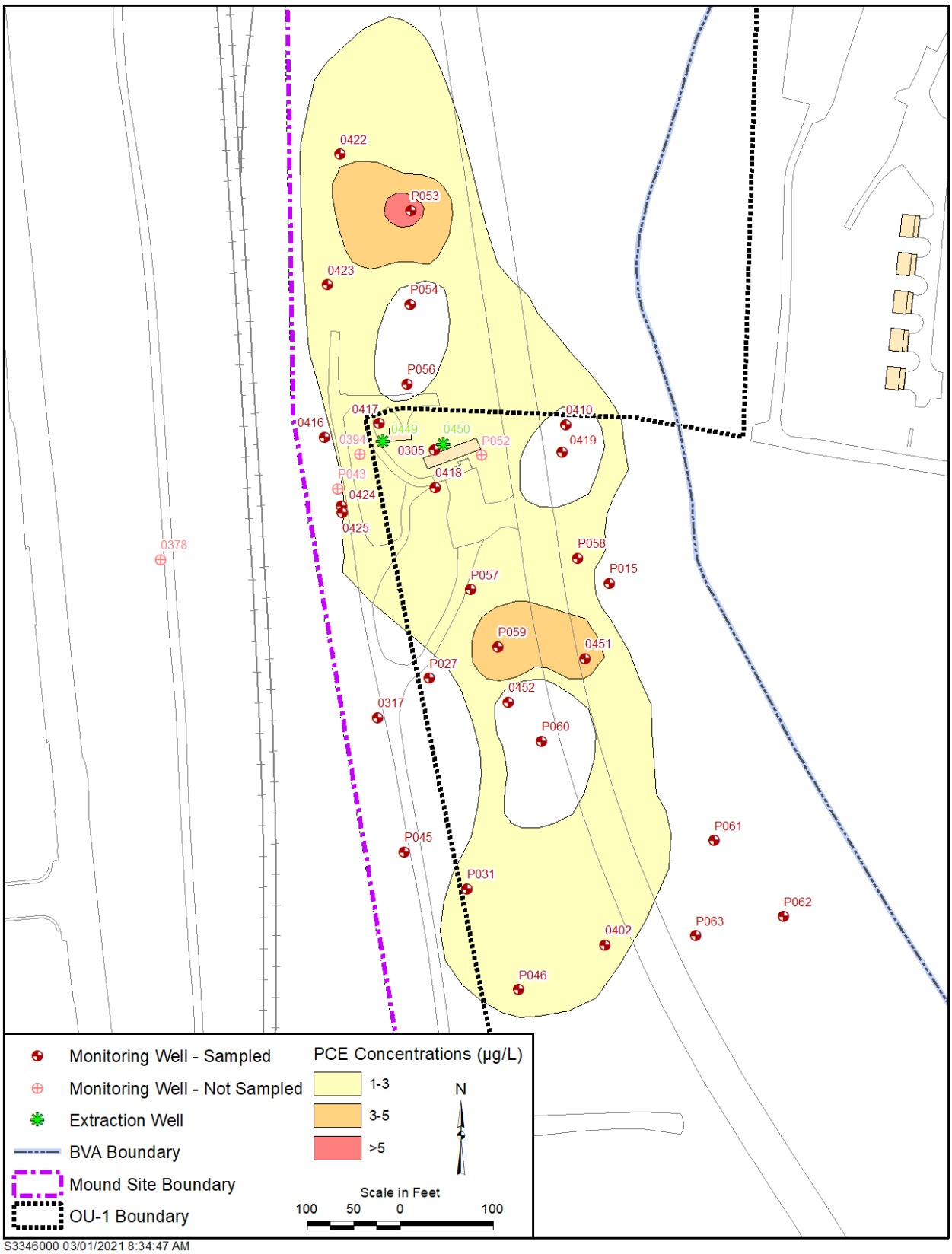

Figure 13. Distribution of PCE, Fourth Quarter (December) 2020

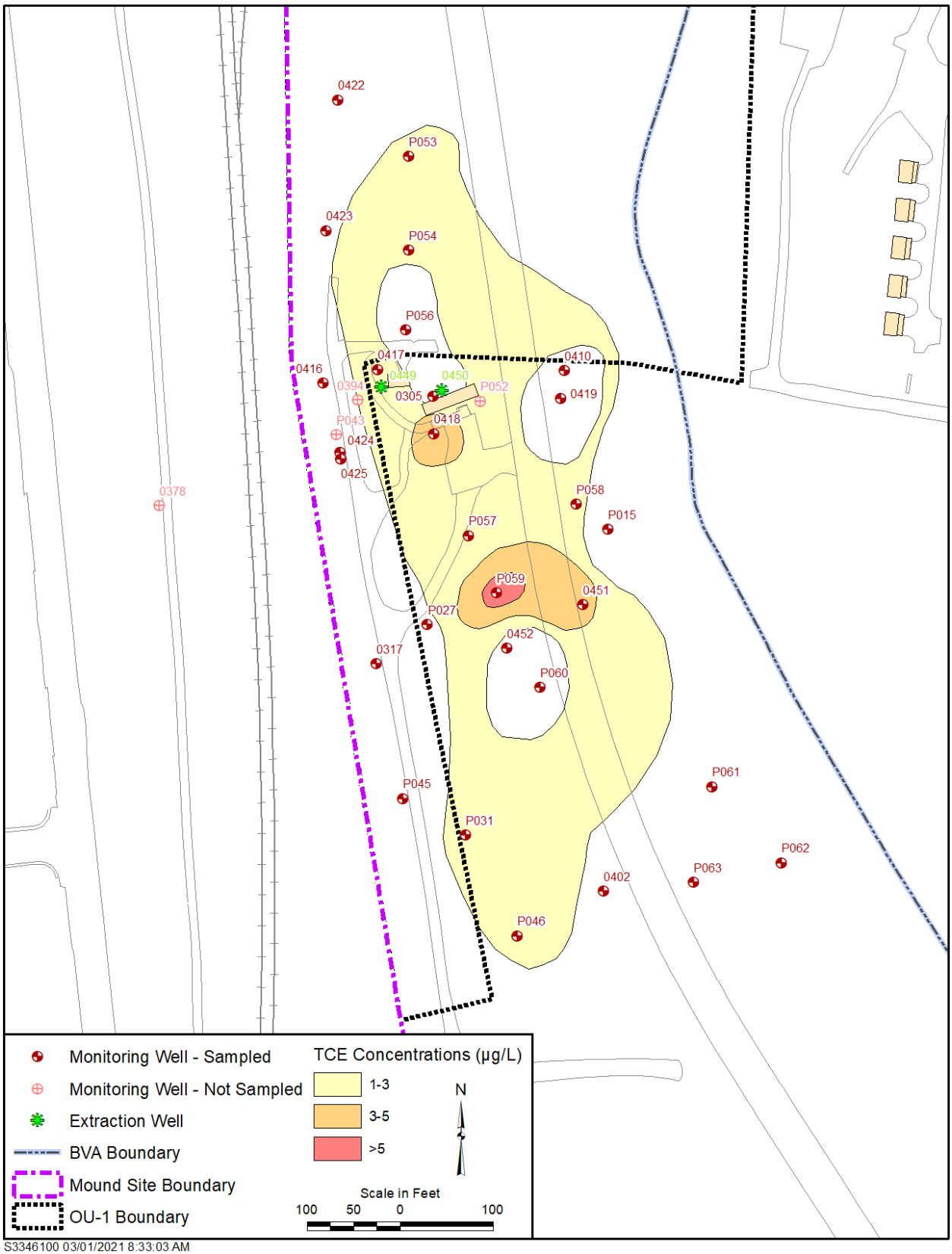

Figure 14. Distribution of TCE, Fourth Quarter (December) 2020

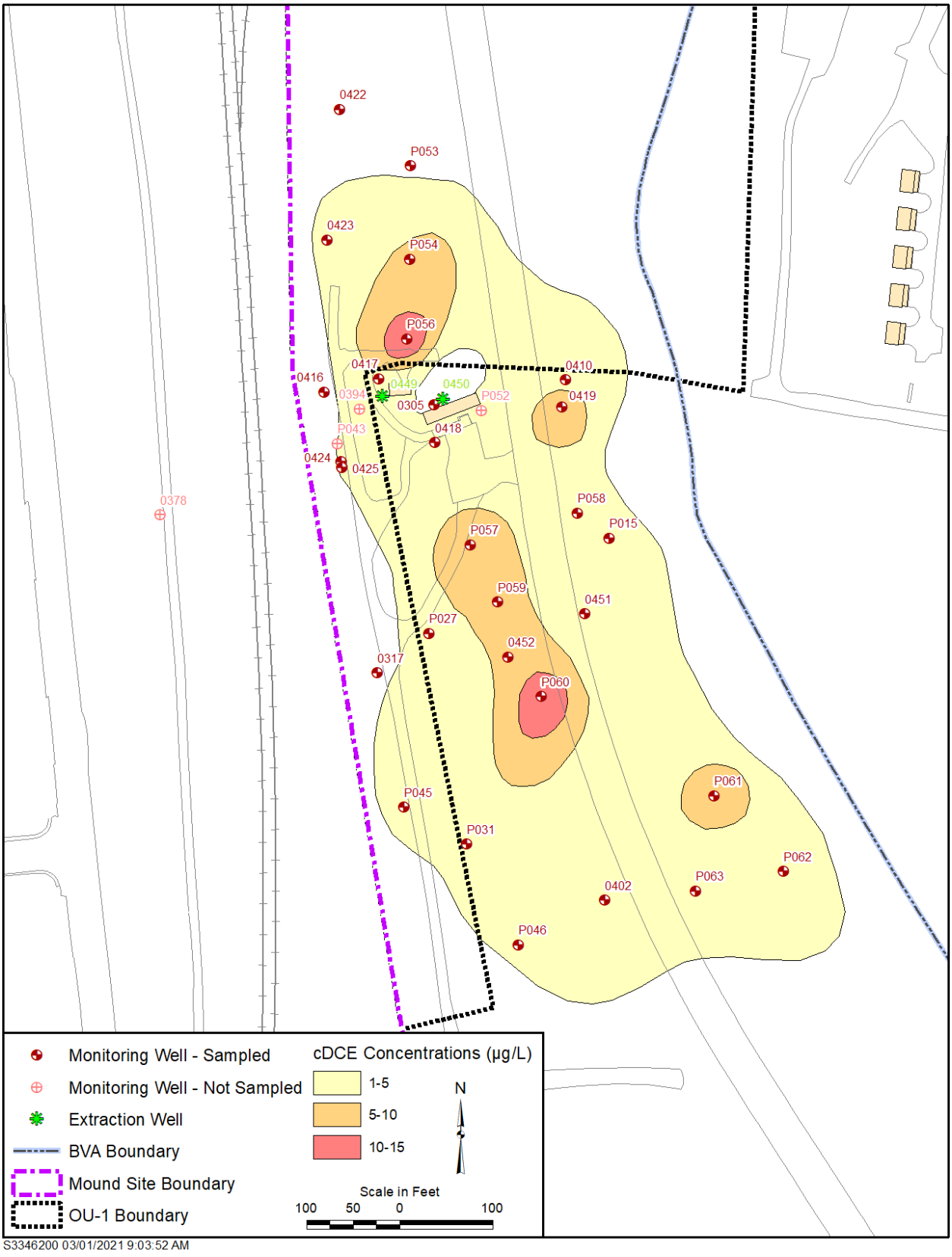

Figure 15. Distribution of cis*-1,2-DCE, Fourth Quarter (December) 2020*

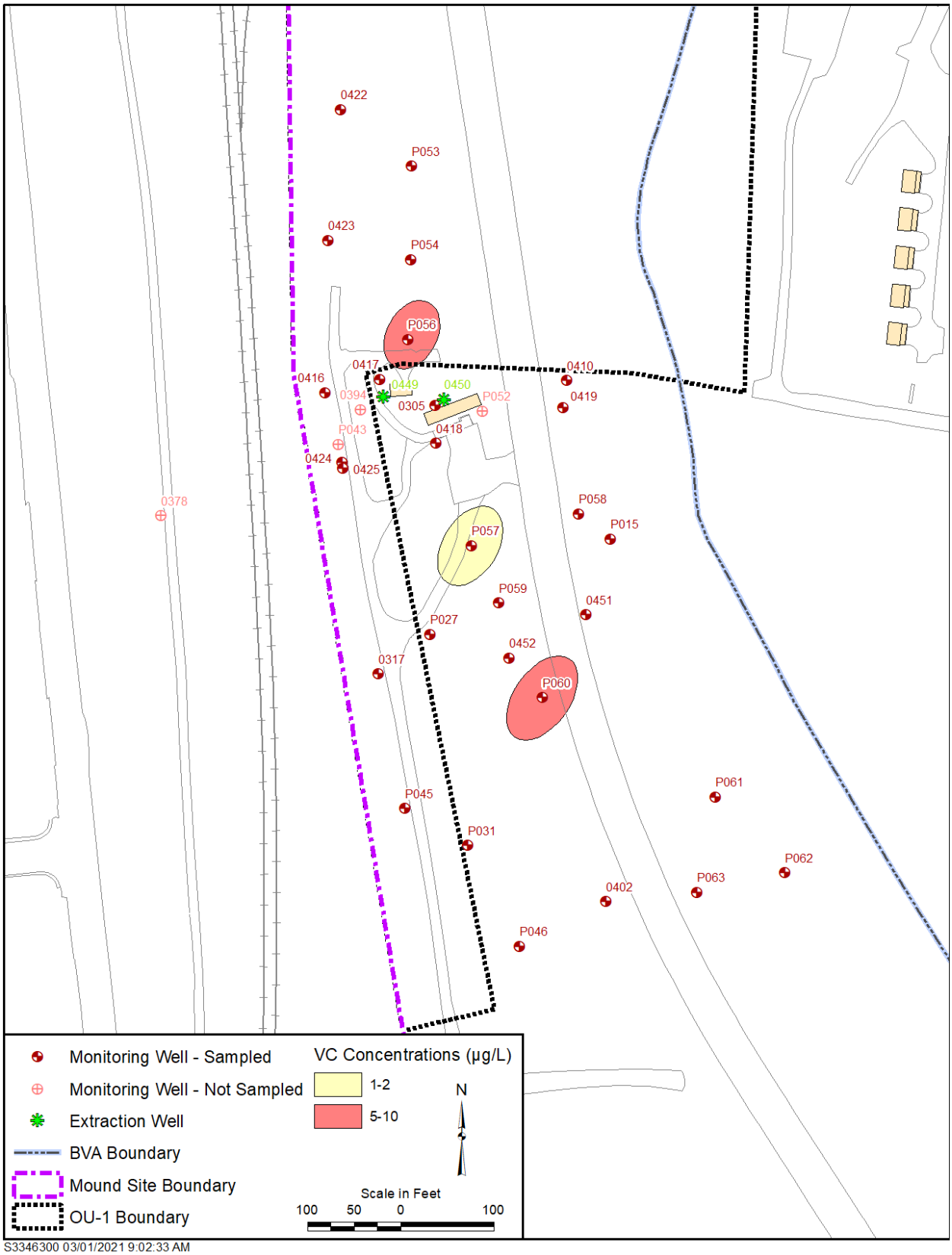

Figure 16. Distribution of VC, Fourth Quarter (December) 2020

4.5 Risk Information Review

A risk information review was conducted for this FYR to determine if the site remedies remain protective based on an updated consideration of residual site risks. For human health, there are potentially four areas where changes could have occurred since the RODs were signed:

- Changes in standards and to-be-considered (TBC)
- Changes in COC toxicity or other contaminant characteristics
- Changes in risk assessment methodology and exposure assumptions
- Changes in conditions, including exposure pathways, new contaminants, or contaminant sources

Table 13 lists the key documents that were reviewed and included RRE documentation (general and parcel-specific), groundwater monitoring reports, and ICs monitoring reports, among others. Toxicity information sources (e.g., Integrated Risk Information System [IRIS] (EPA 2021), EPA preliminary remediation goals [PRGs], and regional screening levels websites) were consulted for the main site risk drivers to determine whether there have been significant changes in the understanding of health-related effects since the last FYR and since the RREs were completed. Per EPA FYR guidance, the review of site-specific risk information included an evaluation of applicable or relevant and appropriate requirements (ARARs), toxicity values, exposure assumptions, and RAOs. The following section describe how each of these changes affect the protectiveness of the remedies.

Table 13. Documents Supporting the Risk Information Review

Document	Purpose	Use for Review
Operable Unit 1 Remedial Investigation Report (DOE 1994)	Documents the RAOS, COPCs, and the potential risks for residential and industrial use scenarios.	Identify major constituents contributing to risks, assess whether toxicity data are still valid, and evaluate continued validity of exposure assumptions.
Mound 2000 Residual Risk Evaluation Methodology, Mound Plant, Final (DOE 1997a)	Documents the methodology for evaluating the residual risk remaining for each parcel.	Assess continued validity of exposure assumptions, RAOs.
Residual Risk Evaluation—Release Block D, Revision Summary—Final (DOE 1998)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Residual Risk Evaluation—Release Block H—Final (DOE 1997b)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Residual Risk Evaluation, Parcel 3, Final (DOE 2001f)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Residual Risk Evaluation, Parcel 4, Final (DOE 2001g)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Phase I Residual Risk Evaluation, Final (DOE 2003c)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Parcel 6, 7, and 8, Residual Risk Evaluation, Final (DOE 2007)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.

Table 13. Documents Supporting the Risk Information Review (continued)

Document	Purpose	Use for Review
Parcel 9 Residual Risk Evaluation, Final (DOE 2011d)	Documents residual risks after site remediation, including data used to calculate risks.	Identify major constituents contributing to residual risks and assess whether toxicity data are still valid.
Operations and Maintenance Plan for the U.S. Department of Energy Mound, Ohio, Site (DOE 2015)	Includes procedure for evaluating acceptability of site uses that were not explicitly evaluated in RREs.	Evaluate continued validity of exposure assumptions.
Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site, Miamisburg, Ohio (DOE 2021)	Describes effectiveness of ICs at the site.	Protectiveness of site conditions.
Sitewide Groundwater Monitoring Report Mound, Ohio, Site, Calendar Year 2020 (DOE forthcoming)	Includes recent groundwater and seep monitoring data.	Protectiveness of site conditions.

Abbreviation:
COPC = contaminant of potential concern

4.5.1 Changes in Standards and TBCs

This section reviews any changes to ARARs used to establish cleanup levels in the RODs. There have been no changes in these numerical values for the constituents that are the main drivers for groundwater remediation at the site since issuance of the RODs that would call into question the protectiveness of the remedies selected for groundwater at the Mound site.

In the preamble to the NCP, EPA states that ARARs are generally "frozen" at the time of the ROD signature, unless new or modified requirements call into question the protectiveness of the selected remedy. For this fifth FYR, all ARARs identified in the RODs were reviewed for changes that could affect the assessment of whether the remedy is protective. The chemical-specific ARARs for groundwater identified in the RODs are MCLs specified in the Safe Drinking Water Act and MCLs identified in State of Ohio regulations (*Ohio Administrative Code* [OAC] Section 3745-81-11 through 3745-81-13 and OAC Section 3745-81-15). Numerical standards for the primary constituents of concern at the site are listed in Table 14.

Table 14. Applicable Groundwater Standards for the Mound Site

Constituent	Standard	ARAR
Tritium	20,000 pCi/L= 20 nCi/L 4 millirem/year	OAC-3745-81-15; 40 CFR 141
Radium-226 + radium-228	5 pCi/L	OAC-3745-81-15; 40 CFR 141
PCE	5 μg/L	OAC-3745-81-12; 40 CFR 141
TCE	5 μg/L	OAC-3745-81-12; 40 CFR 141
cis-1,2,-DCE	70 μg/L	OAC-3745-81-12; 40 CFR 141
trans-1,2-DCE	100 μg/L	OAC-3745-81-12; 40 CFR 141
Vinyl chloride	2 μg/L	OAC-3745-81-12; 40 CFR 141

Abbreviation:
pCi/L = picocuries per liter

4.5.2 Changes in Toxicity and Other Contaminant Characteristics

FYRs require an assessment of toxicity data to determine if there have been any changes that would alter the protectiveness of the remedy. As described below, there are no changes to the toxicity values since the last FYR that would call into question the protectiveness of the remedies. The following is a discussion on changes that have occurred since the last FYR. For a more detailed discussion regarding the risk evaluation process, refer to the Mound 2000 Residual Risk Evaluation Methodology (DOE 1997a) and the fourth FYR report (DOE 2016a).

The Residual Risk Evaluation Methodology uses risk-based guideline values (RBGVs) as a screening tool for identifying COCs to continue assessing under the RRE for a given parcel. The RBGVs are based, in part, on toxicity values. These values have been adjusted over time as new toxicity data have become available. The RRE methodology calls for using an RBGV equivalent to a 10^{-6} risk for carcinogens and for using a value of 0.1 for the noncarcinogenic RBGV as an initial screen for inclusion of constituents for further evaluation. In addition, constituents were retained for screening if they had a frequency of detection of 5% or higher; the 95% upper confidence limit of the mean concentration for each constituent was used as the screening concentration and for residual risk calculations. Because of this conservative approach, it is highly unlikely that any constituents were eliminated from consideration through the RRE process in the past that would warrant inclusion based on changed toxicity values.

Table 15 shows toxicity values that were used to calculate residual risks in the RREs for each parcel for the main risk drivers in soil. To be conservative, constituents included in this table are those which had an incremental hazard quotient $\geq$0.1 or an incremental risk $\geq 1 \times 10^{-7}$ for any exposure route for either construction workers or site workers. (An exception to this is TCE, which was included because of the very large change in noncancer toxicity value.) This table also includes current toxicity values. For this FYR, the Risk Assessment Information System (RAIS) (https://rais.ornl.gov/) was queried to obtain the most recent toxicity values. The RAIS database is a comprehensive source for toxicity data compiled from the EPA IRIS, the EPA Health Effects Assessment Summary Tables, and the EPA Provisional Peer-Reviewed Toxicity Values.

Table 15. Evaluation of Toxicity Values for Residual Soil at the Mound Site

Constituent	Parcels[e]	Toxicity Values from RRE	Current Toxicity Value	Change Since 2016
Chemicals—Carcinogens[a]				
2,3,7,8-TCDD	9	1.3E+5	1.3E+5	No
Aroclor-1248	9	2.00	2.00	No
Arsenic	H	15	1.5	Yes–Lower
Benzo[*a*]pyrene	D, H, 4, Phase I, 6, 7, 8, 9	7.3	1.0	Yes–Lower
Benzo[(*a*]anthracene	D, Phase I, 8	0.73	0.1	Yes–Lower
Benzo[(*b*]fluoranthene	D, 4, 8	0.73	0.1	Yes–Lower
Dibenz[(*a,h*]anthracene	6, 8	7.3	1.0	Yes–Lower
Indeno[1,2,3-*cd*]pyrene	D, 8	0.73	0.1	Yes–Lower
TCE	7, 8, 9	1.3E-02	4.6E-02	No
Chemicals—Noncarcinogens[b]				
Antimony	D, 4, 9	4.0E-04	4.0E-04	No
Arsenic	H	3.00E-04	3.00E-04	No
TCE	7, 8, 9	5.00E-01	5.00E-04	No
Radionuclides—Soil Ingestion[c]				
Ac-227	4	6.26E-10	2.90E-10	No
	Phase I, 8	1.2E-9		No
Pb-210	D	1.10E-9	1.72E-09	No
	4	6.75E-10		No
Pu-238	D, H	3.0E-10	2.25E-10	No
	3, 4	2.95E-10		No
	Phase I	1.3E-10		No
	6, 7, 8, 9	2.72E-10		No
Ra-228+D	4	4.79E-10	1.98E-09	No
	7, 8, 9	2.29E-09		No
Th-228	D	2.3E-10	2.43E-10	No
Th-230	6	2.31E-10	1.66E-10	No
Th-232+D	Phase I	1.4E-09	2.17E-09	No
U-233/U-234	7, 8	1.6E-10	1.50E-10	No
U-238+D	P1	4.0E-09	1.97E-10	No
Radionuclides—External Exposure[d]				
Ac-227	4	9.30E-7	1.98E-10	No
	Phase I, 7, 8	1.5E-06		No
Cs-137	H	2.10E-06	5.52E-10	Yes–Lower
Ra-228+D	4	9.48E-06	4.04E-06	No
	7, 8, 9	4.53E-06		No
Th-228	D	6.2E-06	5.64E-09	No
Th-230	4, 6	3.42E-10	8.45E-10	No
Th-232+D	Phase I	1.2E-05	4.04E-06	No
U-233/U-234	7, 8	9.82E-10	2.53E-10	Yes–Lower
U-238+D	Phase I	8.6E-06	1.19E-07	No

Notes:
[a] Toxicity values are oral slope factors milligrams per kilogram per day $(mg/kg/d)^{-1}$.
[b] Toxicity values are oral reference doses (mg/kg/d).
[c] Toxicity values are soil ingestion slope factors (risk/picocurie).
[d] Toxicity values are external exposure slope factors (risk/year per picocurie per gram).
[e] For radionuclides, red = incremental risk between 1×10^{4} and 1×10^{-5}; green = incremental risk between 1×10^{-5} and 1×10^{-6}; black = incremental risk between 1×10^{-6} and 1×10^{-7}; no incremental risks exceeded 1×10^{-4}.

Abbreviations: Ac = actinium, Cs = cesium, Ra = radium, Th = thorium, U = uranium

The following are changes in toxicity values from those used when the RBGVs were first developed:

- Change in oral slope factor for TCE: Identified during fourth FYR. It was concluded that the only area where TCE was determined to be a contaminant of potential concern (COPC) was Parcels 6, 7, and 8 for soil and for the rest of the areas TCE was either not detected or detected in very low concentrations. As discussed in the fourth FYR, the higher oral slope factor did not affect the identification of TCE as a COPC for those parcels.
- Change in oral slope factors for various chemical constituents: Identified during fifth FYR. It was identified that the oral slope factors for arsenic, benzo[*a*]pyrene, benzo[*a*]anthracene, benzo[*b*]fluoranthene, dibenz[*a,h*]anthracene, and indeno[*1,2,3-cd*]pyrene are lower (i.e., between 7.3 and 10 times lower) than those used when the original RBGVs were developed. This means that RREs today would be 7.3 to 10 times lower for carcinogenic effects than what was calculated in the past. The updated oral slope factors for arsenic and benzo[*a*]pyrene were obtained from EPA IRIS, and the updated slope factors for the remaining four constituents were obtained from the EPA Relative Potency Factor program. These changes do not affect remedy protectiveness.
- Change in toxicity values used in radiation risk assessment: Identified during fourth FYR. EPA had issued addition guidance for radiation risk assessment at CERLCA sites in 2014 that recommends that risk assessments use slope factors included in EPA's PRG calculator. As discussed in the fourth FYR, these changes do not affect remedy protectiveness.
- Change in external slope factors for cesium-137 (Cs-137) and uranium-233/uranium-234 (U-233/U-234): Identified during fifth FYR. The external exposure slope factors for Cs-137 and U-233/U-234 have changed since the last FYR and are lower than those used when the original RBGVs were developed. This means that residual risk estimates today would be significantly lower for carcinogenic effects than calculated in the past. The slope factors currently provided in the EPA PRG calculator are from Oak Ridge National Laboratory from 2021. These changes do not affect remedy protectiveness.

4.5.3 Changes in Risk Assessment Methods

Since the fourth FYR, EPA issued supplemental guidance in the *Human Health Manual, Supplemental Guidance: Update of Standard Default Exposure Factors* (EPA 2014) updating standard default exposure parameters for use on CERCLA sites. The changes impacting the risk calculations for the industrial/commercial scenario used at the Mound site are summarized in Table 16.

Table 16. Summary of Changes to Exposure Parameters for Risk Calculations

Exposure Parameter	Previous Value	Updated (2014) Value
Worker skin surface area for soil – adult (cm^2)	3300	3527
Worker soil adherence factor – adult (mg/cm^2)	0.2	0.12
Adult body weight – adult (kg)	70	80

Abbreviations:
cm^2 = centimeters squared
mg/cm^2 = milligrams per square centimeters

Use of these updated default exposure parameters in place of the original values used in the baseline risk evaluations or RREs for each area results in lowering the cancer risks and noncancer hazard estimates for the adult receptors. Calculations of risk and hazard are linear; therefore, the decrease in cancer risk and noncancer hazard estimates would not be significantly different that the estimates in the original evaluations. These changes do not affect remedy protectiveness.

4.5.4 Changes in Conditions

Discussed below are potential changes that may not have been considered during the evaluation of risk or during development of the original RODs. These changes could include:

- Change in land use
- Change in exposure pathways
- Identification of new contaminants
- Identification of new sources

4.5.4.1 Land Use and Future Land Use

The current and foreseeable future land use at the Mound site is industrial/commercial.

4.5.4.2 Exposure Pathways

Under the Mound 2000 Process, which includes the preparation of an RRE to document the residual contamination and support the ROD for each parcel, an RRE is completed to demonstrate that remedial action goals were met and that a parcel is suitable for industrial/commercial use. The site conceptual model for Mound was defined in the *Residual Risk Evaluation Methodology* and includes the following assumptions for industrial/commercial land use, with construction workers and officer workers as primary receptors. The exposure pathways included the following:

- Ingestion and inhalation of fugitive dust from soil
- Dermal contact with soil
- External radiation from surface soil
- Ingestion of groundwater
- Exposure to vapors from groundwater during showering

The following changes to the exposure pathways have been identified since the original risk evaluations or RREs were completed:

- Elimination of onsite groundwater pathway through potable water: The onsite production wells, which provided process water and drinking water, were removed in 2004 and prohibitions were placed on groundwater use. As a result, the groundwater pathways (ingestion and exposure to vapors from groundwater during showering) were not included in RREs prepared after that date. The remaining exposure pathways are still considered valid.

- Elimination of the groundwater pathway through contact: The site and construction worker scenarios do not anticipate workers to have regular contact with groundwater. It is unlikely that contact with groundwater would occur because the depth to groundwater is typically greater than 25 feet below ground surface (bgs).
- Addition of dermal pathway for soils: It was documented during the fourth FYR that the original RRE methodology did not include the dermal pathway for soils for the site employee scenario. And this pathway was added in the RREs for Parcels 6, 7, and 8 and for Parcel 9. It was concluded that the dermal pathways were not considered to be significant and that previous risk evaluations were still valid.
- Addition of seeps as exposure pathway: It was documented in the fourth FYR that exposure to seeps' water had not been previously addressed because it was considered insignificant. Because there are no controls on access to the seeps, this exposure pathway was addressed for the sake of completeness. It was concluded that the risks due to incidental contact with contaminated seep water was negligible.
- Addition of the VI pathway: As part of the technical assessment for the fourth FYR, VI was evaluated, and it was concluded that there was reliable evidence indicating the presence of vapor-forming chemicals in the subsurface at the Mound site. It was recommended that further VI assessment be performed in areas where buildings are present or future buildings could be constructed to determine whether the VI pathway to building occupants is complete or could be present in the future. The RREs performed for each area listed in Table 13 took into consideration inhalation of fugitive dust and vapors emitted from soil excavated during construction work, and the levels were determined to be acceptable for the construction worker scenario. Groundwater data was compared to the screening levels established for the sitewide VI assessment (see Section 4.5.4.3). This comparison indicated that groundwater in OU-1, Phase I, and Parcels 6, 7, and 8 has concentrations of TCE that exceed the screening level of 3.4 µg/L and groundwater in OU-1 has concentrations of VC that exceed the screening level of 3.1 µg/L. The exposure of workers to vapors emitted from this contaminated groundwater is considered to be incomplete because groundwater is typically greater than 25 feet bgs.

4.5.4.3 New Contaminants or Contaminant Sources

This section outlines any contaminants, contaminant sources, or exposure pathways that have been identified since the fourth FYR.

Vapor Intrusion

The first phase of the VI assessment was completed and documented in the *Vapor Intrusion Assessment: Phase I Preliminary Screening and Conceptual Model for the Mound, Ohio, Site* report (DOE 2019f). The results of the preliminary screening indicated cVOCs and benzene, toluene, ethylbenzene, and xylene (also known as BTEX) and a few other VOCs and polycyclic aromatic hydrocarbons that are considered vapor-forming and are present in either soil, groundwater, or soil-gas at the Mound site. Also, some groundwater and soil-gas results exceeded the preliminary screening level established in the *Vapor Intrusion Assessment Work Plan at the Mound, Ohio, Site* (DOE 2017c). Nine areas were identified as potential vapor source areas that required additional investigation to evaluate if a VI pathway was present. Phase II (vapor source characterization) sampling needs to be completed to determine if vapor sources are

present in the subsurface at concentrations that would result in an unacceptable risk to a building occupant and, if so, determine if complete exposure pathways to current or future buildings are present.

A soil-gas investigation was conducted at the Mound site during February–March 2020 and documented in the *Vapor Intrusion Comparative Soil Gas Sampling Event at Former DOE Mound Facility* (Ohio EPA 2020). The study examined both active and passive sample collection methods and concluded that active sampling will be used for future VI investigations. The results of this preliminary VI investigation are summarized below.

Several VOCs soil-gas concentrations were compared to EPA's soil to gas indoor air vapor intrusion screening levels (VISL). The commercial/industrial scenario was used and based upon either a risk level of 1.0×10^{-6} or a Hazard Index (HI) =1.0. In addition, Ohio EPA's screening levels (set at 1.0×10^{-5} or an HI =1.0) were also used to screen the soil-gas data. The results of these screening level comparisons indicate that several VOCs including TCE, PCE, VC exceed EPA's VISLs (both EPA's and Ohio EPA's) indicating that the VI pathway is a concern at the Mound site (see Table 10 in Ohio EPA 2020).

Emerging Contaminants

EPA maintains a list of emerging contaminants that should be evaluated at cleanups at federal facilities (https://www.epa.gov/fedfac/emerging-contaminants-and-federal-facility-contaminants-concern). EPA considers the listed contaminants are those that present unique issues and challenges to the environmental community and EPA at contaminated federal facility sites. A cursory review of the use of these emerging contaminants at the Mound site was performed and the results are summarized in Table 17.

Table 17. Emerging Contaminant Evaluation for the Mound Site

Contaminant	Used at the Mound Site	Status
1,2,3-Trichloropropane (1,2,3-TCP)	No	No further action.
1,4-Dioxane	Yes	Limited data available regarding use in processes; retained for evaluation.
2,4,6-Trinitrotoluene (2,4,6-TNT)	Possible	No further action. 2,4,6-TNT was not retained for screening under the Mound 2000 Process because it was detected in less than 5% of the samples in both soil and groundwater.
Dinitrotoluene (DNT)	No	No further action.
Hexahydro-1,2,3-trinitro-1,3,5-trianzine (RDX)	Yes	No further action. RDX was not retained for screening under the Mound 2000 Process because it was detected in less than 5% of the samples in both soil and groundwater.
Nanomaterials	No	No further action.
n-nitroso-dimethylamine (NDMA)	No	No further action.
Perchlorate	Yes	Limited data available regarding use in processes; retained for evaluation.
Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)	No	The evaluation of PFOS and PFOA was performed as part of the fourth FYR. EPA has since expanded the evaluation to chemicals that contain PFAS and practices and processes that may have used these chemicals. Metal plating and plastics production were performed at the Mound site and could have used chemicals that contain PFAS; therefore, PFAS have been retained for evaluation.
Polybrominated biphenyls (PBBs)	No	No further action.
Polybrominated diphenyl ethers (PBDEs)	No	No further action.
Tungsten	Yes	No further action. Used in limited quantities in research laboratories in controlled environments.
Vapor intrusion	Yes	Identified in the fourth FYR and continues to be evaluated at the site.

Abbreviations:
2,4,6-TNT = 2,4,6-trinitrotoluene
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RDX = hexahydro-1,2,3-trinitro-1,3,5-trianzine

Perchlorate can be found at sites involved in the manufacture, maintenance, use, or disposal of munitions and rocket fuels. 1,4-dioxane is often found at sites contaminated by other chlorinated solvents, typically 1,1,1-trichloroethane. These contaminants are released to groundwater through spills or improper disposal practices at manufacturing or processing facilities. Both perchlorate and 1,4-dioxane will be retained for further evaluation for the following reasons:

- Perchlorate-containing chemicals were commonly used in explosives production and some electroplating operations. Both of those type of activities were performed at the Mound site, so chemicals used in production work at the site might have contained perchlorate.
- 1,4-dioxane was commonly used as a stabilizer for chlorinated solvents (namely trichloroethane) until 1995, so this chemical might have been present in solvents used at the Mound site.

- It is known that 1,4-dioxane was used in limited quantities in a controlled environment as part of the explosives research performed at the Mound site. The solvent was tested to determine if it could be used for direct crystal growth. The research experiments were abandoned when the desired crystals did not grow.

It should be noted that 1,4-dioxane may be present in specific mixtures (cocktails) used during radiological analyses as part of liquid scintillation analyses (LSA). These cocktails are a mixture of organic solvents, detergents, and fluorescence that are added to the sample. Typically, a small quantity, approximately 10 milliliters is added to a sample. Radiological analyses using LSA were performed at the onsite laboratory at the Mound site to analyze environmental, biological, and bioassay samples for tritium. The cocktail used at the Mound site was Perkin-Elmer Ultima Gold, which does not contain 1,4-dioxane.

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) were evaluated as part of the fourth FYR (DOE 2016a) and the *Summary of Per- or Polyfluorinated Alkyl Substances Record Search for Indications of Use at the Mound Site* was completed in 2017 (DOE 2017) that documented that these two chemicals were not used at the Mound site. Since that time, the EPA has expanded its review of these emerging contaminants to include the broad category of PFAS-containing chemicals or products. This is an extensive list of chemicals and products used in a wide range of processes and is released to groundwater through spills or improper disposal at manufacturing or processing sites. Review of the list provided in "An Overview of the Uses of Per- and Polyfluoroalkyl Substances (PFAS)" (Glüge et. al. 2020) indicates that metals plating and plastics production were processes where PFAS-containing chemicals may have been used. PFAS will be retained for further evaluation for the following reasons:

- A metal plating shop was in M Building where standard metal plating on various surfaces and anodizing of various metals was conducted.
- Plastics production was performed in B Building and Building 28.

Uranium enrichment processes at many DOE sites have been cited to use of PFAS-containing chemicals or products (Glüge et. al. 2020). Research quantities of various uranium isotopes were studied at the Mound site to evaluate different enrichment methods for comparative purposes. These experiments were conducted on a small-scale in the SW and R Building complex and the HH Building in standard chemical laboratories. Thermal diffusion and chemical separation processes were examined for cost, efficiency, and product purity.

5.0 Technical Assessment

The technical assessment examines each remedy to examine if the remedy is, or upon completion, will be protective of human and the environment. The assessment should examine the following three questions that provide a framework for organizing and evaluating data and information and ensure that all relevant issues are considered when determining the protectiveness of a remedy:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Table 18 summarizes the responses to Questions A, B, and C based on the technical assessment discussion provided in the following sections for each area of the Mound site included in this FYR. The organization of the sections in this and subsequent sections deviate from previous FYRs and is now more consistent with the recommendations in EPA's *Five-Year Review Recommended Template* (EPA 2016) in which each area (e.g., OU, parcel, or phase) is discussed separately. A sitewide determination will not be included.

Table 18. Summary of the Technical Assessment

Area	Question A: Is the remedy functioning as intended by the decision documents?	Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?	Question C: Has any other information come to light that could call into question the protectiveness of the remedy?
Parcel D	Y	Y	Y
Parcel H	Y	Y	Y
Parcel 3	Y	Y	Y
Parcel 4	Y	Y	Y
Phase I (A, B, C)	Y	Y	Y
Parcels 6, 7, and 8	Y	Y	Y
OU-1/Parcel 9	Y	Y	Y

5.1 Parcels D, H, 3, and 4

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

The remedies for Parcels D, H, 3, and 4 continue to function as intended by the decision documents. The remedies for soil, groundwater, and buildings or structures consist of use restrictions on land and groundwater use and prohibition on soil removal. IC management activities were performed as outlined in the O&M Plan. DOE performed annual assessments of the effectiveness of ICs each year and found IC remedies for Parcel D, H, 3, and 4 to be functioning as intended.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

No changes to toxicity data or cleanup levels were identified during the review that calls into question the protectiveness of the remedies in Parcels D, H, 3, and 4. The RAOs to reduce exposure to remaining soil and groundwater through land use restrictions, prohibition of soil removal, and groundwater use limitations are still considered valid as no changes were identified that would warrant change or modification.

The VI exposure pathway was not identified in the RRE and a determination on complete exposure pathways for VI at the Mound site is still underway. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

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

It was identified during the fourth FYR that vapor-forming chemicals were used at the Mound site and were present in soil and groundwater in some locations. No reliable evidence existed to determine if any of these possible sources have resulted in soil-gas containing vapor-forming chemicals at concentrations that could pose an exposure risk if a complete exposure pathway were to exist. A VI assessment is ongoing. To date, the first phase of the assessment has been completed and has identified a target list of contaminants and areas to sample for possible source areas. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Increased rainfall could cause minimal surface erosion and affect infrastructure but a robust Long-Term Surveillance and Maintenance Plan (LTS&M Plan) provides measures to protect site infrastructure.

No other information reviewed during this FYR, specifically emerging contaminants, affects the protectiveness of the remedy at this time.

5.2 Phase I (A, B, and C)

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

The remedies for Phase I include:

- ICs that impose use restrictions on land and groundwater use and prohibition on soil removal.
- MNA to address groundwater where VOC concentrations exceed MCLs.

The review determined that the remedies for Phase I continue to function as intended by the decision documents. The remedies for IC management activities were performed as outlined in the O&M Plan. DOE performed annual assessments of the effectiveness of ICs each year and found IC remedy for Phase I to be functioning as intended.

Results from the MNA monitoring indicate that concentrations do not exceed trigger levels. Decreasing TCE concentrations are occurring in one of the bedrock source wells and the downgradient seep. Monitoring in the downgradient BVA well continues to indicate no adverse impact from TCE in the bedrock aquifer. The groundwater monitoring has shown the groundwater remedy is functioning as intended.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

No changes to cleanup levels (MCLs), toxicity data, or cleanup levels were identified during the review that call into question the protectiveness of the remedies in Phase I. The RAOs to reduce exposure to remaining soil and groundwater through land use restrictions, prohibition of soil removal, and groundwater use limitations are still considered valid as no changes were identified that would warrant change or modification.

The VI exposure pathway was not identified in the RRE and a determination on complete exposure pathways for VI at the Mound site is still underway. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

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

It was identified during the fourth FYR that vapor-forming chemicals were used at the Mound site and were present in soil and groundwater in some locations. No reliable evidence existed to determine if any of these possible sources have resulted in soil-gas containing vapor-forming chemicals at concentrations that could pose an exposure risk if a complete exposure pathway were to exist. A VI assessment is ongoing. To date, the first phase of the assessment has been completed and has identified a target list of contaminants and areas to sample for possible source areas. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Two contaminants, perchlorate and 1,4-dioxane, from the EPA emerging contaminant list may have been used or associated with other chemicals used as part of the processes at the Mound site. These two contaminants will be retained for further evaluation, which will include a review of chemicals handled in current and former buildings at the Mound site. Based on the review of chemical inventories and site activities, a determination will be made regarding the use of 1,4-dioxane and perchlorate or products that may contain these chemicals at the Mound site. The information collected will be presented to the Core Team for evaluation to determine if the conditions at the site are protective. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

The EPA has expanded its review of PFOA and PFOS to include the broad category of PFAS-containing chemicals or products that have been used in a wide range of processes, including metals plating and plastics production. This is an extensive list of chemicals and products that are used in a wide range of processes, including metals plating and plastics production. These two processes were employed at the Mound site in three buildings in Parcels 6 and 8. An evaluation of the use of PFAS-containing chemicals or products needs to be completed by the Mound Core Team (DOE, EPA, and Ohio EPA), and a determination regarding the protectiveness of the site conditions needs to be established. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Climate change is a complex topic that involves both regional and seasonal variations (EPA 2016). Over the next 100 years, EPA predicts that Ohio is will have higher than average rainfall and more frequent heavy rainstorms that could lead to increased flooding. Also, EPA expects the average temperature will continue to increase and will potentially lead to more severe summer and fall droughts. In the foreseeable future, these potential changes could impact the groundwater remedy in Phase I as follows:

- Drought conditions could result in a general decrease in the groundwater elevations and result in static water levels below well screens
- Increased precipitation or flooding could result in (1) transient changes in groundwater flow and (2) increased plume movement

The sampling procedures for Phase I include routine monitoring of groundwater elevations. Trends in the groundwater elevations and changed site conditions will be observed and could be addressed to ensure that monitoring was adequate to support the RAOs.

Increased rainfall could cause minimal surface erosion and effect infrastructure, but a robust LTS&M Plan provides measures to protect site infrastructure.

5.3 Parcels 6, 7, and 8

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

The remedies for Parcels 6, 7, and 8 include:

- ICs that impose restrictions on land and groundwater use and prohibition on soil removal.
- Additional ICs that prohibit the removal of concrete floor material from specified rooms of T Building to offsite locations or the penetration of concrete floors in specified rooms of T Building without prior written approval from EPA, Ohio EPA, and ODH.
- MNA to address groundwater where VOC concentrations exceed MCLs.

The review determined that the remedies for Parcels 6, 7, and 8 continue to function as intended by the decision documents. The remedies for IC management activities were performed as outlined in the O&M Plan. DOE performed annual assessments of the effectiveness of ICs each year and found IC remedy for Phase I to be functioning as intended.

Results from the MNA monitoring for TCE indicate that concentrations in several seeps and one well exceed the MCL; however, they do not exceed trigger levels. Decreasing TCE concentrations are occurring in the source wells and seeps. Monitoring in the downgradient BVA well continues to indicate no adverse impact from TCE originating from the Main Hill. The groundwater monitoring has shown the groundwater remedy is functioning as intended.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

No changes to cleanup levels (MCLs), toxicity data, or cleanup levels were identified during the review that calls into question the protectiveness of the remedies in Parcels 6, 7, and 8. The RAOs to reduce exposure to remaining soil and groundwater through land use restrictions, prohibition of soil removal, and groundwater use limitations are still considered valid as no changes were identified that would warrant change or modification.

The VI exposure pathway was not identified in the RRE and a determination on complete exposure pathways for VI at the Mound site is still underway. VI is discussed in more detail in Section 4.5.4.3, “New Contaminants or Contaminant Sources.”

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

It was identified during the fourth FYR that vapor-forming chemicals were used at the Mound site and were present in soil and groundwater in some locations. No reliable evidence existed to determine if any of these possible sources have resulted in soil-gas containing vapor-forming

chemicals at concentrations that could pose an exposure risk if a complete exposure pathway were to exist. A VI assessment is ongoing. To date, the first phase of the assessment has been completed and has identified a target list of contaminants and areas to sample for possible source areas. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Two contaminants, perchlorate and 1,4-dioxane, from the EPA emerging contaminant list may have been used or associated with other chemicals used as part of the processes at the Mound site. These two contaminants will be retained for further evaluation, which will include a review of chemicals handled in current and former buildings at the Mound site. Based on the review of chemical inventories and site activities, a determination will be made regarding the use of 1,4-dioxane and perchlorate or products that may contain these chemicals at the Mound site. The information collected will be presented to the Core Team for evaluation to determine if the conditions at the site are protective. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

The EPA has expanded its review of PFOA and PFOS to include the broad category of PFAS-containing chemicals or products that have been used in a wide range of processes, including metals plating and plastics production. This is an extensive list of chemicals and products that are used in a wide range of processes, including metals plating and plastics production. These two processes were employed at the Mound site in three buildings in Parcels 6 and 8. An evaluation of the use of PFAS-containing chemicals or products needs to be completed by the Mound Core Team (DOE, EPA, and Ohio EPA) and a determination regarding the protectiveness of the site conditions needs to be established. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Climate change is a complex topic that involves both regional and seasonal variations (EPA 2016). Over the next 100 years, EPA predicts that Ohio will have higher than average rainfall and more frequent heavy rainstorms that could lead to increased flooding. Also, EPA expects that the average temperature will continue to increase and will potentially lead to more severe summer and fall droughts. In the foreseeable future, these potential changes could impact the groundwater remedy in Parcels 6, 7, and 8 as follows:

- Drought conditions could result in a general decrease in the groundwater elevations and result in static water levels below well screens
- Increased precipitation or flooding could result in (1) transient changes in groundwater flow and (2) increased plume movement

The sampling procedures for Parcels 6, 7, and 8 include routine monitoring of groundwater elevations. Trends in the groundwater elevations and changed site conditions will be observed and could be addressed to ensure that monitoring was adequate to support the RAOs.

Increased rainfall could cause minimal surface erosion and effect infrastructure but a robust LTS&M Plan provides measures to protect site infrastructure.

5.4 OU-1/Parcel 9

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

The remedies for OU-1/Parcel 9 include:

- ICs that impose restrictions on land and groundwater use and prohibition on soil removal.
- P&T operations to address elevated levels of contamination in groundwater within the former OU-1 landfill through hydraulic containment using extraction wells, treatment, and discharge to the Great Miami River.

As previously discussed, the P&T system was shut off and put into standby mode in 2014 to facilitate the OU-1 Enhanced Attenuation Field Demonstration. As part of an agreement with the regulators, the system has remained in standby mode after the completion of the field demonstration in 2018 to allow the structured geochemical treatment zones (that were developed under natural groundwater flow conditions) to remain in place while DOE pursues an amendment to the groundwater remedy.

The review determined that the remedies for OU-1/Parcel 9 continue to function as intended by the decision documents, even while the P&T system continues to be in standby mode. The IC management activities were performed as outlined in the O&M Plan. DOE conducts annual assessments of the effectiveness of ICs each year and found the IC remedy for OU-1/Parcel to be functioning as intended.

Results from the interim monitoring indicate that the concentrations of PCE and TCE are decreasing, concentrations of *cis*-1,2-DCE and VC have remained low, and the geochemical and microbial conditions that result in the degradation of VOCs in groundwater have been sustained. Also, the VOC plume has remained stable (i.e., not expanding) and concentrations within the plume are low.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

During the most recent review, no changes to cleanup levels (MCLs), toxicity data, or cleanup levels were identified that call into question the protectiveness of the remedies in OU-1/Parcel 9.

The RAOs to reduce exposure to remaining soil and groundwater through land use restrictions, prohibition of soil removal, and groundwater use limitations are still considered valid, and no changes were identified that would warrant change or modification.

The VI exposure pathway was not identified in the RRE and a determination on complete exposure pathways for VI at the Mound site is still underway. However, data collected within the former OU-1 landfill footprint indicated there are concentrations of TCE and VC in soil-gas that are in excess of commercial/industrial risk exposure limits. VI is discussed in more detail in Section 4.5.4.3, “New Contaminants or Contaminant Sources.”

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

It was identified during the fourth FYR that vapor-forming chemicals were used at the Mound site and were present in soil and groundwater in some locations. At that time, no reliable

evidence existed to determine whether any of these possible sources have resulted in soil-gas containing vapor-forming chemicals at concentrations that could pose an exposure risk if a complete exposure pathway were to exist. A sitewide VI assessment is ongoing. To date, the first phase of the assessment has been completed and has identified a target list of contaminants and areas to sample for possible source areas. However, as noted above, data indicates concentrations of TCE and VC in soil-gas that are in excess of commercial/industrial risk exposure limits. VI is discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Two contaminants, perchlorate and 1,4-dioxane, from the EPA emerging contaminant list may have been used or associated with other chemicals used as part of the processes at the Mound site. These two contaminants will be retained for further evaluation, which will include a review of chemicals handled in current and former buildings at the Mound site. Based on the review of chemical inventories and site activities, a determination will be made regarding the use of 1,4-dioxane and perchlorate or products that may contain these chemicals at the Mound site. The information collected will be presented to the Core Team for evaluation to determine if the conditions at the site are protective. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

The EPA has expanded its review of PFOA and PFOS to include the broad category of PFAS-containing chemicals or products that have been used in a wide range of processes, including metals plating and plastics production. This is an extensive list of chemicals and products that are used in a wide range of processes, including metals plating and plastics production. These two processes were employed at the Mound site in three buildings in Parcels 6 and 8. An evaluation of the use of PFAS-containing chemicals or products needs to be completed by the Mound Core Team (DOE, EPA, and Ohio EPA), and a determination regarding the protectiveness of the site conditions needs to be established. Emerging contaminants are discussed in more detail in Section 4.5.4.3, "New Contaminants or Contaminant Sources."

Climate change is a complex topic that involves both regional and seasonal variations (EPA 2016). Over the next 100 years, EPA predicts that Ohio will have higher than average rainfall and more frequent heavy rainstorms that could lead to increased flooding. Also, EPA expects that the average temperature will continue to increase and will potentially lead to more severe summer and fall droughts. In the foreseeable future, these potential changes could impact the groundwater remedy in OU-1 as follows:

- Drought conditions could result in a general decrease in the groundwater elevations and result in static water levels below well screens
- Increased precipitation or flooding could result in (1) transient changes in groundwater flow and (2) increased plume movement or flow direction

The sampling procedures for OU-1 include routine monitoring of groundwater elevations. Trends in the groundwater elevations and changed site conditions will be observed and could be addressed to ensure that monitoring was adequate to support the RAOs.

Increased rainfall could cause minimal surface erosion and effect infrastructure, but a robust LTS&M Plan that provides measures to protect site infrastructure.

6.0 Issues, Recommendations, and Other Findings

It has been determined that all remedies are functioning as designed. Adequate oversight mechanisms appear to be in place to identify possible deficiencies, and adequate resources are available to correct or mitigate any problems, if they were to occur.

6.1 Issues and Recommendations

Table 19 summarizes the four issues that were identified as a result of this FYR, associated the recommendations to address these issues, and milestones to complete identified actions.

Table 19. Issues and Recommendations Identified from the Five-Year Review

OU: Sitewide	**Issue Category: Other – New exposure pathway**			
	Issue: Vapor Intrusion Assessment – Sitewide: Evaluation of the VI pathway was identified as a sitewide issue during the fourth FYR. A sitewide VI assessment is ongoing; however, Phase II sampling to determine whether vapor sources are present in the subsurface at concentrations that would result in unacceptable risk if complete exposure pathways were present has not been completed.			
	Recommendation: Phase II of the sitewide VI assessment, which is vapor source characterization sampling, needs to be completed to determine whether vapor sources are present that could result in unacceptable exposure to a building occupant and, if so, to determine whether complete exposure pathways to a current or future building are present. DOE submitted a draft Sampling and Analysis Plan (SAP) and Quality Assurance Program Plan (QAPP) to the regulators in May 2021 and will resubmit a revised SAP and QAPP to the regulators for approval.			
Affects Current Protectiveness	**Affects Future Protectiveness**	**Responsible Party**	**Oversight Party**	**Milestone Date**
N	Y	LM	EPA	February 15, 2022
OU: OU-1/Parcel 9	**Issue Category: Other – New exposure pathway**			
	Issue: Vapor Intrusion in OU-1/Parcel 9: Recent soil-gas data collected within the former OU-1 landfill footprint (Parcel 9) indicated that concentrations of vapor-forming chemicals in the subsurface, notably TCE and VC, are present at levels that may result in unacceptable risk to building occupants under a commercial/industrial risk scenario if a building was constructed and a complete pathway was present. This exposure pathway is being addressed as part of an amendment to the OU-1 ROD being proposed by DOE. Currently there are no receptors because the area is undeveloped and owned by DOE.			
	Recommendation: The VI exposure pathway is being evaluated as part of an amendment to the OU-1 ROD. The VI addendum to the focused FS for OU-1/Parcel 9 that addresses a remedy change for groundwater has been submitted to EPA and Ohio EPA for review. It is recommended that LM continue with the proposed schedule and provide a proposed plan to EPA and Ohio EPA for approval.			
Affects Current Protectiveness	**Affects Future Protectiveness**	**Responsible Party**	**Oversight Party**	**Milestone Date**
N	Y	LM	EPA	December 31, 2021

Table 19. Issues and Recommendations Identified from the Five-Year Review (continued)

<table>
<tr><td rowspan="3">OU:
Phase I
Parcels 6, 7, and 8
OU-1/Parcel 9</td><td colspan="4">Issue Category: Other – Potential new contaminants</td></tr>
<tr><td colspan="4">Issue: Emerging contaminants (perchlorate and 1,4-dioxane): Two contaminants, perchlorate and 1,4-dioxane, from the EPA emerging contaminant list may have been used or associated with other chemicals used as part of the processes at the Mound site. These two contaminants will be retained for further evaluation. Based on the results of the evaluation, a determination will be made regarding the potential historical use of 1,4-dioxane and perchlorate or products that may contain these chemicals at the Mound site. The information collected will be presented to the Core Team for evaluation to determine if the conditions at the site are protective. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary. However, because there are restrictions on groundwater use at the site, there is no cause for an immediate response action.</td></tr>
<tr><td colspan="4">Recommendation: These two contaminants will be retained for further evaluation, which will include a review of chemicals handled in current and former buildings that were at the Mound site. Based on the review of chemical inventories and site activities, a determination will be made regarding the potential historical use of 1,4-dioxane and perchlorate or products that may contain these chemicals. It is recommended that the results of this research be presented, along with a written summary, to the Mound Core Team for their determination regarding the protectiveness of the site conditions. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary.</td></tr>
<tr><td>Affects Current Protectiveness</td><td>Affects Future Protectiveness</td><td>Responsible Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>N</td><td>Y</td><td>LM</td><td>EPA</td><td>March 31, 2022</td></tr>
<tr><td rowspan="3">OU:
Phase I
Parcels 6, 7, and 8
OU-1/Parcel 9</td><td colspan="4">Issue Category: Other – Potential new contaminants</td></tr>
<tr><td colspan="4">Issue: Emerging Contaminants (per- and polyfluoroalkyl substances [PFASs])
The EPA has expanded its review of PFOA and PFOS to include the broad category of PFAS-containing chemicals or products that have been used in a wide range of processes, including metals plating and plastics production. This is an extensive list of chemicals and products that are used in a wide range of processes, including metals plating and plastics production. These two processes were employed at the Mound site in three buildings in Parcels 6 and 8 in the Main Hill production area. An evaluation of the potential historical use of PFAS-containing chemicals or products in these buildings needs to be completed by the Mound Core Team (DOE, EPA, and Ohio EPA) and a determination regarding the protectiveness of the site conditions needs to be established. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary. However, because there are restrictions on groundwater use at the site, there is no cause for an immediate response action.</td></tr>
<tr><td colspan="4">Recommendation: EPA has expanded its review of PFOA and PFOS to include the broad category of PFAS-containing chemicals or products. This is an extensive list of chemicals and products that are used in a wide range of processes, including metals plating and plastics production. These two processes were employed at the Mound site in three buildings in Parcels 6 and 8 in the Main Hill production area. It is recommended that the results of this research be presented, along with a written summary, to the Mound Core Team for their determination regarding the protectiveness of the site conditions. If the Core Team cannot decide on the protectiveness, then additional information or data may be necessary.</td></tr>
<tr><td>Affects Current Protectiveness</td><td>Affects Future Protectiveness</td><td>Responsible Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>N</td><td>Y</td><td>LM</td><td>EPA</td><td>March 31, 2022</td></tr>
</table>

Abbreviations:
QAPP = quality assurance program plan
SAP = sampling and analysis plan

6.2 Other Findings

In addition, the following are items that were identified during the FYR, but do not affect current or future protectiveness:

- IC soil exemption to centerline of Mound Road: The Mound ICs apply to the area within the entire Mound site boundary, which extends to the center lines of Mound and Benner Roads. In all but two small areas on Mound Road, the quitclaim deeds contain language that exempt the area to the centerline of the road from the IC that prohibits the removal of soil from the original Mound site boundary. LM continues work with the regulators on a legal method allow those two small areas to be exempted from the soil removal IC restriction, for consistency. Removing the soil removal restriction from these two areas would not impact current or future protectiveness of the remedies.
- Sale or transfer of Parcel 9 prior to the OU-1/Parcel 9 ROD Amendment: LM is pursuing an amendment to the OU-1/Parcel 9 ROD. The two-part remedy change would modify the groundwater remedy and address the VI pathway as discussed in Section 3.5 of this FYR. Concurrently, LM is pursuing a sale of the OU-1/Parcel 9 property under the "Transfer of Real Property at Defense Nuclear Facilities for Economic Development" regulation (10 CFR Part 770) This sale will complete transfer of all the Mound site for reuse as an industrial/commercial site. It is unlikely that the sale or transfer of the property will occur before the amendment of the OU-1/Parcel ROD is completed. If the sale or transfer of the property does occur prior to the approval of the ROD amendment and implementation of the remedy, LM has committed to apply additional ICs to manage the VI pathway.

7.0 Protectiveness Statements

This section includes the protectiveness determinations and statements resulting from this fifth Five-Year Review (Table 20).

Table 20. Protectiveness Statements

Operable Unit	Protectiveness Determination	Protectiveness Statement
Parcels D, H, 3, and 4	Short-term protective	The IC remedies for Parcels D, H, 3, and 4 are currently protective of human health and the environment because ICs are in place that impose restrictions on land and groundwater use and prohibition on soil removal are functioning as intended. However, for the remedies to be protective in the long term, the following action needs to be taken to ensure protectiveness: • The determination about possible complete exposure pathways for VI at the Mound site needs to be completed

Table 20. Protectiveness Statements (continued)

Operable Unit	Protectiveness Determination	Protectiveness Statement
OU-1/ Parcel 9	Short-term protective	The groundwater remedy for OU-1/Parcel 9 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent usage of the groundwater in the restricted area. Although the P&T system has been in standby mode since 2014, it is still protective in the short term because monitoring shows the plume is stable (not expanding) and the concentrations and mass of the VOCs are decreasing. Recent soil-gas data collected within the former OU-1 landfill footprint (Parcel 9) showed that concentrations of vapor-forming chemicals in the subsurface, notably TCE and VC), are present at levels that may result in unacceptable risk to building occupants under a commercial/industrial risk scenario if a building was constructed and a complete pathway was present. However, in the short term, it is considered protective because DOE ownership prevents new construction within Parcel 9. For the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: • Attainment of the cleanup standards in OU-1 groundwater will be required to ensure protectiveness • Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site • Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site • Approval and implementation of a remedy to address the VI exposure pathway needs to be completed for OU-1/Parcel 9 as part of the CERCLA process
Phase 1 (A, B, C)	Short-term protective	The remedy for Phase I is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use and prohibition on soil removal is functioning as intended. However, for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: • Attainment of the cleanup standards in Phase I groundwater will be required to ensure protectiveness • Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site • Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site • The determination on complete exposure pathways for VI at the Mound site needs to be completed

Table 20. Protectiveness Statements (continued)

Operable Unit	Protectiveness Determination	Protectiveness Statement
Parcels 6, 7, and 8	Short-term protective	The remedy for Parcels 6, 7, and 8 is currently protective of human health and the environment because exposure pathways that could result in unacceptable risks are being controlled through ICs that prevent use of the groundwater in the restricted area. The IC portion of the remedy that imposes restriction on land and groundwater use, prohibition on soil removal, and prohibition of removal or penetration of concrete floors in specified rooms and areas of T Building is functioning as intended. However, for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: • Attainment of the cleanup standards in Parcels 6, 7, and 8 groundwater will be required to ensure protectiveness • Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site • Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site • The determination on complete exposure pathways for VI at the Mound site needs to be completed
Sitewide	Short-term protective	The remedy at the Mound site currently protects human health and the environment through ICs that are in place to reduce exposure to contaminated soil and groundwater. Contaminated soil and materials generated during remediation have been removed from the site and disposed of permanently. The underlying soil has been verified to meet cleanup standards that ensure that residual contamination does not pose an unacceptable risk to future users, as long as compliance with the IC that limits land use to commercial/industrial use only is maintained. Currently, groundwater monitoring in Phase I and Parcels 6, 7, and 8 indicate that the groundwater remedies are functioning as required to meet RAOs. The groundwater remedy for OU-1/Parcel 9 continues to function as intended, even though the P&T system continues to be in standby mode while DOE pursues an amendment to the ROD. Results from interim monitoring indicate that the concentrations of PCE and TCE are decreasing, and the plume is not expanding. However, for the remedy at the Mound site to be protective in the long term, the following actions need to be taken to ensure protectiveness: • Attainment of the cleanup standards in groundwater in Phase I, Parcels 6, 7, and 8, and OU-1 • Evaluation of perchlorate and 1,4-dioxane from the EPA emerging contaminant list needs to be completed to determine if they were used at the Mound site • Evaluation of PFAS from the EPA emerging contaminants list needs to be completed to determine if they were used in association with metals plating and plastics production at the Mound site • An assessment of complete exposure pathways for VI needs to be completed at the site • Approval and implementation of a remedy to address the VI exposure pathway needs to be completed for OU-1/Parcel 9 as part of the CERCLA process

8.0 Next Review

This is the fifth statutory FYR for this site. The next FYR will be conducted in 2026.

9.0 References

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Appendix A

Community Notification and Involvement

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Public Involvement Activities and Documents for the 2021Mound Site Fifth Five Year Review (FYR)

1. LM September 3, 2020, letter notifying EPA and Ohio EPA of start of 2021 FYR: Initiation of the Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Review for the Mound, Ohio, Site (EPA ID: OH6890008984).
2. EPA September 10, 2020, response letter to LM: Fifth Five-Year Review for the Mound Plant (USDOE), Ohio, Site.
3. Public notice and proof of posting in Dayton Daily News on November 1, 2, and 3.
4. Public notice and survey posted on Mound web page.
5. Email on October 29, 2020 that notified stakeholders that information about the FYR and a survey were on web page and encouraged them to complete survey.
6. Email on November 30, 2020, reminding same stakeholders of the web page and survey.
7. Two stakeholder surveys that were returned.
8. Two LM responses to surveys.
9. Email invitation to Mound site property owners to participate in a teleconference on January 21 to review the site ICs and answer any questions. Email reminder of meeting.
10. Mound Development Corporation and the City of Miamisburg representatives participated in the presentation of the physical inspection results that replaced the annual walkdown with LM, EPA, Ohio EPA, and ODH. The usual walkdown was replaced with a video conference because of COVID travel restrictions. Presentation attached.

Department of Energy
Washington, DC 20585

September 3, 2020

Mr. David Seely
Remedial Project Manager
U.S. Environmental Protection Agency
Region 5 (SR-6J)
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Mr. Brian Nickel
EPA Supervisor, DERR
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Subject: Initiation of the *Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Review* for the Mound, Ohio, Site
(EPA ID: OH6890008984)

Dear Mr. Seely and Mr. Nickel:

The U.S. Department of Energy Office of Legacy Management (LM) is initiating the fifth *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review* for the Mound, Ohio, Site (Mound Plant). The five-year review is a CERCLA statutory requirement for National Priority List sites that implemented remedial actions resulting in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure. This review and resulting report will be prepared in accordance with the U.S. Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance,* June 2011 and *Recommended Evaluation of Institutional Controls: Supplement to the 'Comprehensive Five-Year Guidance,'* September 2011.

LM will initiate the five-year review on October 1, 2020 and anticipates making questionnaires or interviews available to stakeholders from March 1 to April 30, 2021. This timeframe coincides with our annual institutional control inspection.

LM plans to complete the five-year review by July 1, 2021 and submit the draft report to stakeholders, EPA, and Ohio EPA for review. LM will transmit the final report to EPA by September 21, 2021 and request written concurrence by September 28, 2021. The above schedule is consistent with prior Five-Year Reviews.

Please contact me at (513) 648-3333 or sue.smiley@lm.doe.gov if you have any questions. Please send any correspondence to:

U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Hwy.
Harrison, OH 45030

Sincerely,

SUSAN SMILEY
Digitally signed by SUSAN SMILEY
Date: 2020.09.03 14:35:59 -04'00'

Susan L. Smiley
Mound Site Manager

cc:
Shannon Dettmer, ODH
Lorrie Huber, MDC
Chris Fine, City of Miamisburg
Ellen Stanifer, City of Miamisburg
Gwen Hooten, DOE-LM (e)
Brian Zimmerman, DOE-LM (e)
Becky Cato, Navarro (e)
Erin Coates, Navarro (e)
Chuck Friedman, Navarro (e)
Melissa Lutz, Navarro (e)
Joyce Massie, Navarro (e)
DOE Read File
File: E/19/595 F20/198

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF: SR-6J

September 10, 2020

Ms. Susan Smiley
U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Hwy.
Harrison, OH 45030

Subject: Fifth Five-Year Review for the Mound Plant (USDOE), Ohio, Site

The purpose of this letter is to initiate the fifth five-year review (FYR) of the selected Superfund remedies for the Mound Plant (USDOE) Superfund Site, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP).

In a letter dated September 16, 2016, the U.S. Environmental Protection Agency (EPA) concurred with the protectiveness statements for the selected remedies in the fourth FYR. To facilitate the timely completion of the fifth FYR, EPA requests that the Department of Energy, Office of Legacy Management (LM) initiate the preparation of the fifth FYR such that the following milestones are met with the completion of the fifth FYR by September 16, 2021, five years after the completion of the fourth FYR. EPA recommends that LM:

- initiate review of site-specific data collected since the last FYR; assess the technical conditions; and evaluate current and future land uses;
- publish the Five-Year Review public notice within the next three months;
- plan for a site inspection within the next three to six months;
- provide a draft FYR for review 4-6 months prior to the statutory FYR date of September 16, 2021.

EPA Region 5 recommends the use of the attached "Five Year Review Recommended Template (OLEM 9200_0-89, Region 5 Version 8.8.2018)" for the efficient preparation of the FYR. The most current FYR guidance, including revised FYR summary form, evaluation of institutional controls, vapor intrusion assessment, FYR FAQs, and other relevant documents at EPA' s Five-Year Review website:

https://www.epa.gov/superfund/writing-five-year-reviews-superfund-sites#general_anchor

If you have any questions or require additional information, please contact me by phone at (312) 886-7058 or by e-mail at seely.david@epa.gov.

Sincerely,

9/10/2020

X David P. Seely

David P. Seely
Remedial Project Manager
Signed by: Seely, David

Attachment

ec: Nefertiti DiCosmo, EPA
Richard Nagle, EPA ORC
Brian Nickel, OEPA

LEGAL NOTICE for Mound Site 2021 CERCLA Five-Year Review

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fifth Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review of the Mound site in Miamisburg, Ohio. The CERCLA Five-Year Review process ensures that the selected CERCLA remedies remain protective of human health and the environment.

After the Mound Plant Site was placed on the CERCLA National Priorities List in 1989, DOE signed a CERCLA Section 120 Federal Facility Agreement with the U.S. Environmental Protection Agency (EPA) in October 1990 and a tripartite agreement among the DOE, EPA, and Ohio EPA in 1993. The site was divided into sections and remediated to EPA's risk-based standards for industrial-commercial use only. The entire site is being transferred to the Mound Development Corporation (MDC) for reuse as the Mound Business Park.

The selected CERCLA remedies for the Mound site are:

- Collection and treatment of volatile organic compound-contaminated groundwater via pump and treat system and discharge of treated water, which controls the migration of contaminated groundwater in the Operable Unit 1 (OU-1) area through hydraulic capture.
- Control of surface water in the OU-1 area and long-term groundwater monitoring are part of the OU-1 remedy.
- Monitored natural attenuation for trichloroethylene (TCE) in the Phase 1 parcel and for TCE and tritium within the Main Hill Seeps in the main hill bedrock groundwater system.
- Sitewide institutional controls (ICs).

DOE monitors the groundwater to verify that contamination is not impacting the Buried Valley Aquifer and that contaminant concentrations are decreasing to levels below the Safe Drinking Water Act Maximum Contaminant Level. Groundwater monitoring plans for each remedy are approved by the regulators.

ICs are legal and administrative tools incorporated into deed restrictions on future land and groundwater use for protecting human health and the environment. Mound site ICs are designed to:

1. Prohibit the removal of soil from the original DOE Mound Plant Property boundaries, unless prior written approval from Ohio EPA and Ohio Department of Health (ODH) has been obtained.

2. Prohibit the extraction or consumption of, exposure to, or the use in any way of groundwater underlying the premises, unless prior written approval from EPA and Ohio EPA has been obtained.

3. Limit land use to industrial/commercial use only. Each parcel Record of Decision identifies land uses that will not be permitted, but the list is not all-inclusive. Parcels may not be used for any residential or farming activities, or any activities that could result in the chronic exposure of children less than 18 years of age to soil or groundwater from the premises. Restricted uses include, but are not limited to:

- Single or multifamily dwellings or rental units.
- Daycare facilities.
- Schools or other educational facilities for children less than 18 years of age.
- Community centers, playgrounds, or other recreational or religious facilities for children less than 18 years of age.

4. Prohibit the removal of concrete floor material in specified rooms of T Building to offsite locations without prior written approval from EPA, Ohio EPA, and ODH.

5. Prohibit the penetration of concrete floors in specified rooms of T Building without prior written approval from EPA, Ohio EPA, and ODH.

6. Allow site access to federal and state agencies for sampling and monitoring.

Between January and June 2021, DOE will review relevant documents and data; conduct site inspections with regulators, MDC, and the city of Miamisburg; contact local stakeholders; and develop a report detailing the results. DOE will post a public notice when the report is available on the LM website at www.energy.gov/lm/mound-ohio-site-cercla-five-year-review.

DOE invites the public to learn more about the review process and contribute information by completing the survey questionnaire on the website at www.energy.gov/lm/mound-ohio-site.

Information on the CERCLA Five-Year Review process is also available at the U.S. Environmental Protection Agency website at www.epa.gov/superfund/cleanup/postconstruction/5yr.htm or by contacting:

Sue Smiley
Mound Site Manager
U.S. Department of Energy
Office of Legacy Management
sue.smiley@lm.doe.gov or mound@lm.doe.gov

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In and for the State of Ohio
My Commission Expires July 31, 2024

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Sue Smiley
Mound Site Manager
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11-1,11-2,11-3/2020

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Start/Stop	Newspaper Reference	Product	Description - Other Comments/Charges	Ad Size Billed Units	Times Run	Gross Amount	Net Amount
11/01/2020 11/30/2020	I00655676-11012020 PO#Mound Site 2021 CERCLA Five-Year Review	Dayton Daily News MOUND SITE 2021 CERCLA FIVE-YEAR REVIEW	LEGAL NOTICE for Mound Site 2021 CERCLA Five-Year Review The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fifth Comprehen Legals Page B|9	2 x 88 L 176	3	$3,041.28	$3,041.28
11/4/2020		**Total Amount Due**					**$3,041.28**

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PAYMENT COUPON

STATEMENT #	BILLING DATE	TERMS OF PAYMENT	ADVERTISER CLIENT #	ADVERTISER/CLIENT NAME
	11/04/2020	Upon Receipt	13459	Navarro Research & Engineering

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PO BOX 645274
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Navarro Research & Engineering
10995 Hamilton-Cleves Hwy
HARRISON, OH 45030

TOTAL AMOUNT	AMOUNT ENCLOSED
$3,041.28	

0010000013459000001345900000000000003041289

Mound, Ohio, Site: CERCLA Five-Year Review

Office of Legacy Management

The Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fifth Five-Year Review of the ongoing protectiveness of selected remedies for environmental impacts at the Mound, Ohio, Site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

The purpose of the review is to ensure the CERCLA remedies remain protective of human health and the environment. The review team will study site reports, past and present monitoring and inspection data, monitoring and surveillance practices, and conduct a physical inspection of the site. The review began in September 2020 with a final report due in September 2021.

Previous Five-Year Review reports, additional Mound, Ohio, Site documents, and other information is also available on the LM Mound, Ohio, Site website.

Community involvement is integral to the mission of the Mound site and the CERCLA five-year review process. DOE values and requests feedback you may have regarding the site's activities over the last five years.

The questionnaire is located below. For questions or to request a hard copy of the questionnaire, please call (513) 648-3330, or email Mound@lm.doe.gov. Completed questionnaires will be accepted through November 27, 2020.

Sincerely,

Sue Smiley
Mound, Ohio, Site Manager, DOE Office of Legacy Management
(513) 648-3330 • Sue.Smiley@lm.doe.gov

- Public Notice of Mound Site Fifth Five-Year Review
- Five-Year Review Report, Fourth Five-Year Review for the Mound, Ohio, Site Miamisburg, Ohio (September 2016)
- Public Notice of Mound Site Fourth Five-Year Review
- Five-Year Review Report, Third Five-Year Review for the Mound, Ohio, Site Miamisburg, Ohio (September 2011)
- Five-Year Review Report, Second Five-Year Review for the Mound, Ohio, Site Miamisburg, Ohio (September 2006)

Fifth CERCLA Five-Year Review

FIFTH CERCLA FIVE-YEAR REVIEW QUESTIONNAIRE (AVAILABLE OCTOBER 28-NOVEMBER 27, 2020)

Questionnaire Directions:

1. Click on the link above and the questionnaire will open.
2. Save the questionnaire to your computer before completing the questions.
3. Open your saved version and complete the questions.
4. Save the completed questionnaire.
5. Submit via email or USPS as directed on the questionnaire.

OFFICE of
LEGACY MANAGEMENT

1000 Independence Avenue, SW
Washington, DC 20585

Phone: 202-586-7550
Fax: 202-586-8403

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Mound, Ohio, Site

U.S. Department of Energy
Office of Legacy Management

10995 Hamilton-Cleves Highway
Harrison, OH 45030-9728

MOUND SITE

CERCLA Five-Year Review Survey

Community involvement is an integral part of the Mound site and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Review process. The U.S. Department of Energy welcomes your input and comments about the Mound site. In the survey below, you may answer as many or as few questions as you feel comfortable answering. Comments will be accepted through Nov. 27, 2020.

MOUND SITE

CERCLA Five-Year Review Survey

THIS DOCUMENT MUST BE SAVED TO YOUR COMPUTER BEFORE COMPLETING

Are you affiliated with the Mound, Ohio, Site or any site-related group (e.g., former worker, neighbor, former citizen group member, regulator, etc.)?

How did you learn about the Mound site?

How close to the Mound site do you live?

❑ 1 mile ❑ 5 miles ❑ 10 miles ❑ 20 miles ❑ 50 miles ❑ 100 miles

How informed do you feel about the site's activities and progress?

Have you ever visited the Mound site?

❑ Yes ❑ No

If you do not feel well informed, how would you suggest the DOE Office of Legacy Management keep the community better informed?

What is your overall impression of the Mound site?

What effects has completion of building demolition and soil cleanup had on the surrounding community (groundwater cleanup is still underway)? What was the strongest positive effect? What was the strongest negative effect?

Do you have any comments, suggestions, or recommendations regarding the site's management? Do you have any other comments or suggestions?

Are you aware of any community concerns regarding the site?
If so, please provide details so we can follow up and address the concerns.

If you would like to be contacted, please provide your contact information below. Thank you!

NAME: _____ PHONE: _____

EMAIL: _____

ADDRESS: _____

_____

From: Massie, Joyce (CONTR)
To: Mound
Cc: Smiley, Sue; Lutz, Melissa (CONTR); Coates, Erin (CONTR); Cato, Becky (CONTR); Borgman, Penny (CONTR); Zimmerman, Brian
Bcc:

Subject: Mound Site 2021 CERCLA Five-Year Review is underway - Please Visit LM website for survey
Date: Thursday, October 29, 2020 6:53:00 PM

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fifth five-year review at the Mound, Ohio Site, as required by Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This act requires that remedial actions which result in any hazardous substances, pollutants, or contaminants remaining on site at levels that do not allow for unlimited use and unrestricted exposure be subject to five-year reviews.
The purpose of the CERCLA five-year review is to ensure that the remedies that were implemented at the site continue to be protective of human health and the environment.
As part of this review, LM encourages input from local officials, residents, and others who may be interested in the site.
We have posted previous five-year review reports, the 2020 public notice, and a stakeholder questionnaire on the DOE LM website at

https://www.energy.gov/lm/mound-ohio-site-cercla-five-year-review.

We invite you to visit the website to review the information and to complete the questionnaire before November 27.
If you have any questions, please contact the LM Site Manager, Sue Smiley, at sue.smiley@lm.doe.gov or at 513-648-3330.

Joyce Massie
Technical Support
Mound, Ohio, Site
Navarro LMS Team
Contractor to the U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway, Harrison, OH 45030
(937) 287-1333
Joyce.massie@lm.doe.gov

From: Mound
To: Mound
Cc: Smiley, Sue; Lutz, Melissa (CONTR); Cato, Becky (CONTR); Zimmerman, Brian; Coates, Erin (CONTR)
Bcc:

Subject: FW: Mound Site 2021 CERCLA Five-Year Review is underway - Please Visit LM website for survey
Date: Monday, November 30, 2020 1:01:00 PM

We are very interested in your input about the Mound Site, so we are extending the Mound site five-year review survey response date to December 8, 2020.

- Please save and then complete the short questionnaire at: **https://www.energy.gov/sites/prod/files/2020/10/f80/2020%20Five-Year%20Review%20Stakeholder%20Survey.pdf**
- Return the pdf file via email to **mound.lm.doe.gov** or print and mail to the address below.

You can find general information about the Mound site at https://www.energy.gov/lm/mound-ohio-site
If you have any questions, please contact the DOE LM Site Manager, Sue Smiley, at sue.smiley@lm.doe.gov or at 513-648-3330.
Thank you and stay well.

Mound, Ohio, Site
Navarro Research and Engineering, Inc.
Contractor to the U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway, Harrison, OH 45030
(937) 645-5051
mound@lm.doe.gov

From: Massie, Joyce (CONTR) <Joyce.Massie@lm.doe.gov>
Sent: Thursday, October 29, 2020 6:54 PM
To: Mound <Mound@lm.doe.gov>
Cc: Smiley, Sue <Sue.Smiley@lm.doe.gov>; Lutz, Melissa (CONTR) <Melissa.Lutz@lm.doe.gov>; Coates, Erin (CONTR) <erin.coates@lm.doe.gov>; Cato, Becky (CONTR) <Becky.Cato@lm.doe.gov>; Borgman, Penny (CONTR) <Penny.Borgman@lm.doe.gov>; Zimmerman, Brian <Brian.Zimmerman@lm.doe.gov>
Subject: Mound Site 2021 CERCLA Five-Year Review is underway - Please Visit LM website for survey

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is conducting the fifth five-year review at the Mound, Ohio Site, as required by Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This act

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The purpose of the CERCLA five-year review is to ensure that the remedies that were implemented at the site continue to be protective of human health and the environment.
As part of this review, LM encourages input from local officials, residents, and others who may be interested in the site.
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https://www.energy.gov/lm/mound-ohio-site-cercla-five-year-review.

We invite you to visit the website to review the information and to complete the questionnaire before November 27.
If you have any questions, please contact the LM Site Manager, Sue Smiley, at sue.smiley@lm.doe.gov or at 513-648-3330.

Joyce Massie
Technical Support
Mound, Ohio, Site
Navarro LMS Team
Contractor to the U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway, Harrison, OH 45030
(937) 287-1333
Joyce.massie@lm.doe.gov

MOUND SITE

CERCLA Five-Year Review Survey

THIS DOCUMENT MUST BE SAVED TO YOUR COMPUTER BEFORE COMPLETING.

Are you affiliated with the Mound, Ohio, Site or any site-related group (e.g., former worker, neighbor, former citizen group member, regulator, etc.)?

Former employee for 35 years and currently on the Board of Directors for the Mound Science and Energy Museum Association

How did you learn about the Mound site?

Worked there

How close to the Mound site do you live?

☐ 1 mile ☑ 5 miles ☐ 10 miles ☐ 20 miles ☐ 50 miles ☐ 100 miles

Have you ever visited the Mound site?

☑ Yes ☐ No

How informed do you feel about the site's activities and progress?

In general, I feel very good about the reutilization of the site. I am very please to see the new constuction on site.

What is your overall impression of the Mound site?

DOE Legacy Management and the Mound Development Corp. have done good job in converting the site for public commercial use. Some areas are the site especially the old Main Hill and the SM PP hill area are becoming a bit overgrown. The areas around the buildings and property that have been sold are nicely kept but the hillsides and some of the unsold parcels have been left to grow. I believe this detracts from the appearance of the Mound Industrial Park. The back forty as we used to call it is not a big eye sore and

If you do not feel well informed, how would you suggest the DOE Office of Legacy Management keep the community better informed?

Legacy management was giving quarterly update at the Mound Cold War Discovery Center be for the MSEMA's presentations but sinc Govi -19 has brouhgt the inperson meeting to a halt I for one a missed hearin those updates.

What effects has completion of building demolition and soil cleanup had on the surrounding community (groundwater cleanup is still underway)? What was the strongest positive effect? What was the strongest negative effect?

I believe that the clean up of the Mound Lab was well executed and has a positive effect on the future commercialization of the area. The only negative that I can think of is again the appearance of some of the areas.

Do you have any comments, suggestions, or recommendations regarding the site's management? Do you have any other comments or suggestions?

This is just my personal opinion, and I'm sure the City of Miamisburg had what they believed to be valid reason(s) for letting Mr. Cluxton go, but I can't help think it was a negative impact on the future of the site.

Are you aware of any community concerns regarding the site? If so, please provide details so we can follow up and address the concerns.

am aware that there are still residences of the area that think the Site is a health concern. The subject still comes up in casual conversation and I do my best to enlighten the person to the massive cleanup and final condition of the site. I think in general Legacy Management has done about as much as possible to correct these concerns with out talking individually to each resident. Time will fade the past is all I can say.

If you would like to be contacted, please provide your contact information below. Thank you!

NAME: DETAIL REMOVED PHONE: _____

EMAIL: _____

ADDRESS: _____

From:	Smiley, Sue
To:	XXXXX
Cc:	Zimmerman, Brian; Lutz, Melissa (CONTR); Massie, Joyce (CONTR)
Subject:	Thank you for responding to Mound CERCLA Five Year Review survey!
Date:	Tuesday, December 29, 2020 11:28:36 AM

XXX, thank you for your comments via the Mound site CERCLA five-year review survey.

We will pass along your suggestion that excessive overgrowth detracts from the general appearance of the Mound site as a general observation of a Mound stakeholder. The Mound Development Corporation (MDC) and the City of Miamisburg share ownership of the areas you mention that have not been sold to private companies. LM still owns ~18.5 acres in the Operable Unit-1 area south of the current Excelitas complex. MDC manages the balance of Mound Business Park properties through a maintenance contractor.

It is always hard to dispel concerns of some local residents who think the site is a health concern. We work to keep the public informed through public notices and the updates at MSEMA meetings. I can assure you that LM is diligent in monitoring site uses and groundwater quality, and publishes results of inspections and sampling that verify compliance with all requirements.

The Navarro staff and I have enjoyed working with you and appreciate your help whenever we have sought it. You have always responded warmly and freely shared your expertise as a long-time Mound employee and dedicated member of the Mound Science & Energy Museum Association. Although I am retiring, I will remain in Miamisburg and look forward to attending MSEMA lecture series that catch my eye!

Brian Zimmerman (CC'd) is now the Acting LM Mound Site Manager, so please feel free to communicate with Brian in future re. any Mound questions or concerns.. My last day with DOE is December 30.

Best wishes for the New Year!

Sue Smiley
Site Manager, Fernald Preserve
Site Manager, Mound, Ohio, Site
U.S. DOE, Office of Legacy Management
10995 Hamilton-Cleves Highway
Harrison, OH 45030

MOUND SITE

CERCLA Five-Year Review Survey

THIS DOCUMENT MUST BE SAVED TO YOUR COMPUTER BEFORE COMPLETING

Are you affiliated with the Mound, Ohio, Site or any site-related group (e.g., former worker, neighbor, former citizen group member, regulator, etc.)?

Yes, Mound Laboratory employee from 1969 until 1985. Also, a board member (i.e., Director) of the Mound Science & Energy Museum Association (MSEMA) since July 2014.

How close to the Mound site do you live?

❑ 1 mile ◘ 5 miles ❑ 10 miles ❑ 20 miles ❑ 50 miles ❑ 100 miles

Have you ever visited the Mound site?

◘ Yes ❑ No

What is your overall impression of the Mound site?

The general condition is very good with the grounds, buildings, and roadway well maintained.

It is excellent to have the Mound Cold War Discovery Center located on the property to tell the general history of the Mound Site.

What effects has completion of building demolition and soil cleanup had on the surrounding community (groundwater cleanup is still underway)? What was the strongest positive effect? What was the strongest negative effect?

With the cleanup following demolition this is little visual evidence of the extensive facilities that were once located at this site.

Are you aware of any community concerns regarding the site?
If so, please provide details so we can follow up and address the concerns.

None, that I'm know.

How did you learn about the Mound site?

Since I am both a former employee besides growing up in the immediate, I'm fully aware of the Mound site and all of the changes that occurred over the past 30+ years since its closure.

How informed do you feel about the site's activities and progress?

I keep myself fairly well informed from Mound museum meetings, DOE-LM postings, messages, etc.

If you do not feel well informed, how would you suggest the DOE Office of Legacy Management keep the community better informed?

I have no specific suggestions.

Do you have any comments, suggestions, or recommendations regarding the site's management?
Do you have any other comments or suggestions?

1.) I would like to see more stories and Internet postings on social media to publicize existence and activities of the Mound Cold War Discovery Center and the website of the MSEMA.
2.) I would like to see greater interactions of DOE-LM with organizations such as the Miamisburg Historical Society, Ohio History Connection, National Park Services on Mound Site and its museum.

If you would like to be contacted, please provide your contact information below. Thank you!

NAME: Removed detail

EMAIL: _____

ADDRESS:[1] _____

From:	Smiley, Sue
To:	xxxxxx
Cc:	Zimmerman, Brian; Lutz, Melissa (CONTR); Massie, Joyce (CONTR)
Subject:	Thank you for responding to the Mound CERCLA Five Year Review survey!
Date:	Tuesday, December 29, 2020 11:32:38 AM

xxxx, thank you for your comments via the Mound site CERCLA five-year review survey.

We will share your suggestions with Dayton History (DH) to publish more stories of the Mound Cold War Discovery Center (MCWDC) on the internet and social media, as a general observation of a Mound stakeholder. Will also share your suggestion with DH and the Mound Development Corporation to have greater interactions with other federal, state, and local historical and citizen organizations to increase public awareness of the MCWDC.

I have enjoyed working closely with you on the MCWDC and remain optimistic for a successful and sustainable operation. Although I am retiring, I will remain in Miamisburg and look forward to attending MSEMA lecture series that catch my eye!

Brian Zimmerman (CC'd) is now the Acting LM Mound Site Manager, so please feel free to communicate with Brian in future re. any Mound questions or concerns.. My last day with DOE is December 30.

Best wishes for the New Year!

Sue Smiley

Site Manager, Fernald Preserve
Site Manager, Mound, Ohio, Site
U.S. DOE, Office of Legacy Management
10995 Hamilton-Cleves Highway
Harrison, OH 45030
Office: 513-648-3333
FAX: 513-738-2137
Mobile: 513-310-1279
sue.smiley@lm.doe.gov

From: Massie, Joyce (CONTR)
To: Stakeholders

Cc:
Subject: Mound site annual institutional controls review meeting with property owners
Date: Thursday, January 7, 2021 1:48:00 PM
Attachments: Mound Site Landowners IC Compliance form 2021.pdf

---

To all Mound site property owners and their representatives.

The DOE Office of Legacy Management (LM) conducts an annual assessment each year to assure that the Mound site institutional controls (ICs) remain effective. ICs are the administrative and legal controls that run with the land in the form of restrictions and covenants in the deeds and the *Environmental Covenant*.

Our new LM acting Mound site manager, Brian Zimmerman, would like to discuss the ICs, answer questions, and review the attached IC compliance form with you.

Because of coronavirus, we invite you and/or others representing your organization to a teleconference to review the ICs:

- **Teleconference on Thursday, January 21, 2021**
- **Time: 10:00 a.m.**
- **Subject: Mound site institutional controls review and Q&A**
- **Call in # (877) 925-0594, passcode 9361865#**

If you are unable to participate at that time, but have questions about the ICs or the form, please contact Brian Zimmerman at brian.zimmerman@lm.doe.gov or me.

Please review, sign, scan, and return the attached Property Owners' IC Compliance Form via email to me at joyce.massie@lm.doe.gov.

Thanks, and stay well.

Joyce Massie
Technical Support
Mound, Ohio, Site
Navarro LMS Team
Contractor to the U.S. Department of Energy
Office of Legacy Management
(937) 287-1333
Joyce.massie@lm.doe.gov

From:	Massie, Joyce (CONTR)
To:	Stakeholders
Cc:	
Subject:	RE: Mound site annual institutional controls review meeting with property owners
Date:	Thursday, January 21, 2021 7:18:00 AM
Attachments:	Mound Site Landowners IC Compliance form 2021.pdf

Hope you can join our call this morning to review the Mound site institutional controls.

- **Teleconference on Thursday, January 21, 2021**
- **Time: 10:00 a.m.**
- **Subject: Mound site institutional controls review and Q&A**
- **Call in # (877) 925-0594, passcode 9361865#**

Joyce Massie
Technical Support
Mound, Ohio, Site
Navarro LMS Team
Contractor to the U.S. Department of Energy
Office of Legacy Management
10995 Hamilton-Cleves Highway, Harrison, OH 45030
(937) 287-1333
Joyce.massie@lm.doe.gov

From: Massie, Joyce (CONTR)
Sent: Thursday, January 7, 2021 1:49 PM
To: stakeholders
Subject: Mound site annual institutional controls review meeting with property owners

To all Mound site property owners and their representatives.

The DOE Office of Legacy Management (LM) conducts an annual assessment each year to assure that the Mound site institutional controls (ICs) remain effective. ICs are the administrative and legal controls that run with the land in the form of restrictions and covenants in the deeds and the *Environmental Covenant*.

Our new LM acting Mound site manager, Brian Zimmerman, would like to discuss the ICs, answer questions, and review the attached IC compliance form with you.

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Thanks, and stay well.

Joyce Massie
Technical Support
Mound, Ohio, Site
Navarro LMS Team
Contractor to the U.S. Department of Energy
Office of Legacy Management
(937) 287-1333
Joyce.massie@lm.doe.gov

U.S. DEPARTMENT OF ENERGY | Legacy Management

2021 Fifth CERCLA Five-Year Review at the Mound, Ohio, Site

Summary of Review

Brian Zimmerman
Mound Site Manager
U.S. Department of Energy (DOE)
Office of Legacy Management (LM)

February 11, 2021

1

LM Is Conducting the 2021 CERCLA Five-Year Review

- Why
  - As required by Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).
  - SARA requires that remedial actions that result in any hazardous substances, pollutants, or contaminants remaining on site at levels that do not allow for unlimited use and unrestricted exposure be subject to a five-year review (FYR).
- Schedule
  - Began FYR process with U.S. Environmental Protection Agency (EPA) concurrence in September 2020.
  - Continue FYR process and send draft report to EPA and Ohio EPA for review.
  - Obtain EPA concurrence and publish final report by Sep.16, 2021.

2

2

CERCLA Five-Year Review - Purpose and Scope

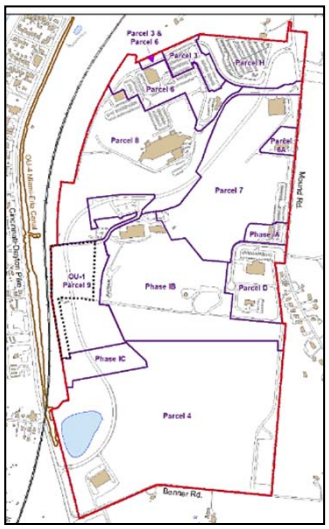
- Purpose: Ensures that the CERCLA Record of Decision (ROD) remedies remain protective of human health and the environment
- Scope: Evaluates effectiveness of remedies for all Mound ROD parcels since the 2016 FYR.

3

3

Mound ROD Parcel Remedies

ROD Parcel	Remedy
Parcels 3, 4, D, and H	• Institutional controls (ICs)
Phase 1 (A, B, C) Parcel	• Monitored natural attenuation (MNA) for trichloroethylene (TCE) • ICs
Parcels 6, 7, and 8	• MNA for TCE and tritium in the main hill bedrock groundwater system commonly known as the Main Hill Seeps and wells 0315 and 0347 • ICs + special T Bldg. ICs
Parcel 9 / OU-1	• Hydraulic containment via pump and treatment, and discharge of groundwater • ICs



4

4

LM Continually Monitors Remedies

- Periodic groundwater monitoring verifies that:
  - Residual contamination is not impacting the Buried Valley Aquifer.
  - Contaminant concentrations in the source areas are decreasing to levels below the Maximum Contaminant Level.
- Annual IC assessments monitor the effectiveness of the ICs.
- Monitoring results are analyzed and presented periodically in:
  - Monthly reports (Environmental Restoration (ER) Monthly Report).
  - Annual reports (IC Assessment and Sitewide Groundwater).
  - Five-year reviews (FYR Report).

5

5

LM Continues the CERCLA FYR Process

- Reviewing previous FYR recommendations.
- Assessing each remedy to ensure it is functioning as intended.
  - Groundwater: review data analysis from periodic groundwater sampling.
  - IC compliance: conduct annual IC assessments to determine if ICs remain effective.
- Involving stakeholders and requesting feedback.
- Conducting physical inspections of site by LM contractor in 2021. (Photos follow this summary presentation)
- Obtaining a high-resolution aerial photo of site.
- Determining if the risk assessment assumptions and cleanup standards are still valid.
- Verifying remedy is still protective of human health and the environment.
- Evaluating opportunities for optimization of the remedies.
- Recommending remedy modifications, if necessary.
- Preparing report with FYR results.
- Obtaining EPA approval of final report due Sep. 16, 2021.

6

6

2016 CERCLA FYR Recommendations Complete

- Vapor Intrusion
  - Evaluate for potential risk from vapor intrusion
  - Propose additional actions if needed.
  - **Completed.** Published the *Vapor Intrusion Assessment: Phase I Preliminary Screening and Conceptual Model for the Mound, Ohio, Site* in May 2017.
  - Phase II sitewide vapor intrusion assessment is ongoing
- Polyfluorinated Alkyl Substances (PFAS) Assessment
  - Conduct PFAS research on any PFAS use at Mound.
  - Present results to Core Team
  - **Completed**. *A Summary of the Per- and Polyfluorinated Alkyl Substance Records Search for Indication of Use at the Mound, Ohio, Site in* December 2016. The results indicated that no PFAS were used at the Mound site, and no further action is required
  - **No PFAS were used on the Mound site,**

7

Status of FYR

- Stakeholder/Public Participation
  - Published public notices in *Dayton Daily News*.
  - Placed FYR information and public survey on LM Mound public website.
  - Invited stakeholders via email to visit website and complete the survey.
  - Received and responded to 2 stakeholder comments.
- Physical inspections of site
  - Completed.
  - Photos will be shown after this presentation.
- Other FYR steps in process: document reviews, interviews, data analysis, aerial photography.
- Report
  - Draft report in process.
  - Regulators will review and provide comments.
  - LM and regulators will resolve comments.
  - EPA approval of final report due by September 16, 2021.

8

8

Questions?

- Questions on process and/or schedule?
- Next presentation includes pictures of site physical inspections.

9

9

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Appendix B

Site Inspection Checklist and Interviews

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2021 Mound Site FYR -- Institutional Controls Remedy Checklist	
I. SITE INFORMATION	
Site name: Mound Plant Site	**Dates of annual IC assessment: December 2020 through February 2021** **Date of site physical inspection: 1/27/2021**
Location and Region: Miamisburg, Ohio	**EPA ID: OH6890008984**
Agency, office, or company leading the five-year review: **US Department of Energy Office of Legacy Management (DOE LM)**	**Weather/temperature of physical inspection: Cloudy/30s**

This portion of the site remedy includes: (Check all that apply)

☐ Landfill cover/containment
☐ Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Surface water collection and treatment
☐ Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
X Other **Site-wide information (i.e., programs, costs, and documents) is evaluated in this checklist**

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.)

The following participated in the Feb. 11, 2021 FYR presentation and review of photos of physical inspection results

Agency Ohio EPA
Contact Brian Nickel | Supervisor
Division of Environmental Response and Revitalization
Ohio EPA Southwest District Office (SWDO) |
401 East Fifth Street, Dayton, OH, 45402-2911
(937) 285-6468
Brian.Nickel@epa.ohio.gov
Problems; suggestions None reported

Agency Ohio Department of Health
Shannon Dettmer
Ohio Department of Health Bureau of Radiation Protection
246 N. High St.
Columbus, OH 43215-1099
(614) 995-0761
Shannon.Dettmer@odh.ohio.gov
Problems; suggestions; None reported

4. **Other contacts** (optional) **X** Report to be published. - **Annual Assessment of the Effectiveness of Institutional Controls at the Mound, Ohio, Site - 2021**

Ryan Homsi – City of Miamisburg, City Planner

Leslie Karacia – City of Miamisburg, Engineering Department – building permit review

Sharon Long – City of Miamisburg, Engineering Department – engineering request permits review

Lorrie Huber – MDC (Mound Site Manager) – property owner representative

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

1. **O&M Documents**
   X O&M manual **X** Readily available
   Currently being updated
   As-built drawings Readily available ☐ Up to date ☐ N/A
   Maintenance / OU-1 P&T inspection logs were readily available and up to date
   Remarks:_Inspections follow Navarro Controlled Manual
   _____

2. **Site-Specific Health and Safety Plan** **X** Readily available **X** Up to date ☐ N/A
   X Contingency plan/emergency response plan **X** Readily available **X** Up to date ☐ 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**
   ☐ 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 **X** Contractor for Federal Facility
☐ Other_____

2. **O&M Cost Records**

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

Total annual cost by year for review period if available

Year	O&M Cost	OU-1 Field Demonstration Cost	Combined O&M Cost
2016	$332,410	$105,745	$438,155
2017	$221,328	$166,614	$387,942
2018	$202,113	$65,591	$267,704
2019	$199,123	NA	$199,123
2020	$183,509	NA	$183,509
Total	$1,138,483	$337,950	$1,478,449

Abbreviation:
n/a = not applicable

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 N/A

Remarks: Although not an IC requirement, signs at City-owned pond near southwest site entrance can discourage unacceptable uses that don't comply with the industrial/commercial use restrictions.. The City/MDC added wording to the signs this year that prohibits specific activities.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes **X** No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes **X** 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** ___Office of Legacy Management

Contact __**Brian Zimmerman** __**Mound Site Manager**____ _**February 2021** _____

Name Title Date Phone no.

Reporting is up-to-date **X** Yes ☐ No ☐ N/A

Reports are verified by the lead agency **X** Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met **X** Yes ☐ No ☐ N/A

Violations have been reported Yes ☐ No **X** N/A

Other problems or suggestions:

None. No violations

All annual reports available on LM Mound webpage at

https://www.energy.gov/lm/mound-ohio-site

under "Site documents and Links"

_____

_____

_____

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

Remarks____**Annual IC assessment reports and results from five-year inspections indicate that ICs are functioning as intended.** _____

_____

D. General

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

Remarks_____

_____

2. **Land use changes on site**

Remarks___**LM identified an encroachment of an MDC building into the Parcel 9 area still owned by LM. LM and MDC are working to resolve the issue.**

_____

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

Remarks_____

_____

VI. GENERAL SITE CONDITIONS

A. Roads

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

Remarks

_____

B. Other Site Conditions

Remarks

Property ownership changed during the FYR period.
LM transferred remaining portions of Parcels 6, 7, and 8 and part of Parcel 9 to MDC.
LM retains 4 lots in the OU-1 area.

VII. LANDFILL COVERS ☐ Applicable **X** N/A

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

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable **X** N/A

X. OTHER REMEDIES

The institutional controls remedy covers the entire site: Parcels 3, 4, D, H, Phase 1 (A, B, and C), 6, 7, 8, and 9.

Other groundwater remedies that apply to Phase 1; Parcels 6, 7, and 8; and Parcel 9 (OU-1) are evaluated in the following groundwater remedy checklists.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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 primary remediation objective was to ensure that any residual risk associated with each parcel was acceptable based on the agreed-upon industrial/commercial end-use as the only use. In general, the restrictions required under CERCLA to ensure that the parcel being transferred is protective of human health and the environment are:

- **Limit land use to industrial/commercial only**
- **Prohibit the removal of soil from the property boundaries**
- **Prohibit extraction or consumption of groundwater**
- **Prohibit the removal or penetration of concrete floor material in specific rooms of T building**
- **Allow site access for sampling and monitoring**

Institutional controls have been implemented in the form of deed restrictions on future land use as outlined in the RODs for Parcels D, H, 3, and 4, Phase I, and Parcels 6, 7, 8, and 9. Institutional controls for Parcel 9 are also imposed with an environmental covenant in accordance with Ohio Revised Code.

An environmental summary was prepared after each ROD that fulfills the requirements of CERCLA Section 120(h). The environmental summary included a discussion of the contamination that was present, the remedial actions that have taken place, and the residual risk that remains.

Describe issues and observations relating to whether the remedy is effective and functioning as designed.
The annual IC assessments determined that the ICs continue to function as designed, adequate oversight mechanisms are in place to identify possible violations of ICs, and adequate resources are available to correct or mitigate any problems if violations occur.

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 Plan for the US Department of Energy, Mound, Ohio, Site* (DOE 2015). DOE has performed annual IC assessments including walk-overs and records reviews each year and has found that portion of the remedy to be functioning as intended.**

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 have been identified from this review.**
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. **None have been identified from this review.**

I. SITE INFORMATION

Site name: Mound Plant Site	**Dates of FYR review period: January 2016 through May 2021** **Date of site physical inspection: 1/27/2021**
Location and Region: Miamisburg, Ohio	**EPA ID: OH6890008984**
Agency, office, or company leading the five-year review: US Department of Energy Office of Legacy Management (DOE LM)	**Weather/temperature of physical inspection: Cloudy/30s**

Remedy Includes: (Check all that apply)

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

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews included with Institutional Controls checklist

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
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** — **X** Readily available — **X** Up to date — ☐ N/A
   X 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_____

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 — ☐ 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_____			
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

Costs included with Institutional Controls checklist

V. ACCESS AND INSTITUTIONAL CONTROLS **X** Applicable ☐ N/A

Institutional controls covered under separate checklist

VI. GENERAL SITE CONDITIONS

General site conditions covered under Institutional Controls checklist

VII. LANDFILL COVERS ☐ Applicable **X** N/A

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

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   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☐ 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_____
_____

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
X Is routinely submitted on time **X** Is of acceptable quality

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

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐ Needs Maintenance ☐ 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.).

Groundwater in Phase I is monitored for TCE and its degradation products to verify that the concentrations of TCE are decreasing due to natural attenuation and contaminated groundwater 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 well 0411, well 0443, and seep 0617 are decreasing and that TCE is not impacting the BVA.

Groundwater monitoring has been performed as prescribed in the *Operations and Maintenance Plan for the US Department of Energy, Mound, Ohio, Site*, which incorporated the requirements of the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan*. Results from this monitoring indicate that concentrations do not exceed target levels and concentrations of TCE in the source wells have been declining or remaining stable. A new monitoring well was installed to better assess possible impacts of TCE-contaminated groundwater that discharges from the bedrock into the BVA. This well P064 was installed in 2017 and monitoring in BVA wells 0400, 0402, and P033 was discontinued with approval from the regulators. Otherwise, no changes to the monitoring program have been made on the basis of the data collected during this period.

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 Plan for the US Department of Energy, Mound, Ohio, Site*. 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.

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

I. SITE INFORMATION

Site name: Mound Plant Site	**Dates of FYR review period: January 2016 through May 2021** **Date of site physical inspection: 1/27/2021**
Location and Region: Miamisburg, Ohio	**EPA ID: OH6890008984**
Agency, office, or company leading the five-year review: US Department of Energy Office of Legacy Management (DOE LM)	**Weather/temperature of physical inspection: Cloudy/30s**

Remedy Includes: (Check all that apply)

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

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews included with Institutional Controls checklist

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
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** — **X** Readily available — **X** Up to date — ☐ N/A
   X 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_____

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 — ☐ 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_____			
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

Costs included with Institutional Controls checklist

V. ACCESS AND INSTITUTIONAL CONTROLS **X** Applicable ☐ N/A

Institutional controls covered under separate checklist

VI. GENERAL SITE CONDITIONS

General site conditions included with Institutional Controls checklist

VII. LANDFILL COVERS ☐ Applicable **X** N/A

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

IX. GROUNDWATER/SURFACE WATER REMEDIES X Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable X N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable X N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable X 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☐ 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_____
_____

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
X Is routinely submitted on time **X** Is of acceptable quality

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

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐ Needs Maintenance ☐ 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.).

Groundwater in the Parcels 6, 7, and 8 area is monitored for tritium and TCE and its degradation products to verify that the downgradient BVA is not affected and to verify that source removal will result in decreasing concentrations. In addition, groundwater discharging from seeps is monitored for the same constituents.

Groundwater monitoring has been performed as prescribed in the *Operations and Maintenance Plan for the US Department of Energy, Mound, Ohio, Site*. Results from this monitoring indicate that concentrations of VOCs, primarily TCE, are variable in the source wells. The trigger level for TCE in groundwater in source wells was not exceeded during this FYR period. Trend analysis indicates downward trends in TCE concentrations in all the wells and seeps. The MCL for TCE is exceeded only in source well 0347. The BVA wells shows infrequent estimated detections of TCE. Elevated tritium continues to be measured in the groundwater and seeps with the highest levels measured in the seeps. Seep 0601, located onsite, is the only location that exceeded the MCL since 2017. Decreasing tritium levels are observed in all the seeps and groundwater wells.

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 Plan for the US Department of Energy, Mound, Ohio, Site*. 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.

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

I. SITE INFORMATION	
Site name: Mound Plant Site	**Dates of FYR review period: January 2016 through May 2021** **Date of site physical inspection: 1/27/2021**
Location and Region: Miamisburg, Ohio	**EPA ID: OH6890008984**
Agency, office, or company leading the five-year review: US Department of Energy Office of Legacy Management (DOE LM)	**Weather/temperature of physical inspection: Cloudy/30s**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
☐ Access controls
☐ Institutional controls
X Groundwater pump and treatment
☐ Surface water collection and treatment
☐ Monitored natural attenuation
X Groundwater containment
☐ Vertical barrier walls
X Other ___**Permitted discharge of treated water**_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interview included with Institutional Controls checklist.

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 — **X** Readily available — **X** Up to date — ☐ N/A
   - ☐ Maintenance logs — **X** Readily available — **X** Up to date — ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** — **X** Readily available — **X** Up to date — ☐ N/A
   - **X** 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_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☐ N/A
   - **X** Effluent discharge — **X** Readily available — **X** 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 — **X** N/A

   Remarks_____

6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	**X** N/A
	Remarks_____			
7.	**Groundwater Monitoring Records**	**X** Readily available	☐ Up to date	☐ N/A
	Remarks_____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	**X** N/A
	Remarks_____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☐ N/A
	X Water (effluent)	**X** Readily available	**X** Up to date	☐ N/A
	Remarks____**Data reported in monthly DMR reports to OEPA**_____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	**X** N/A
	Remarks_____			

IV. O&M COSTS

Costs included with Institutional Controls checklist.

V. ACCESS AND INSTITUTIONAL CONTROLS **X** Applicable ☐ N/A

Institutional controls covered under separate checklist

VI. GENERAL SITE CONDITIONS

General site conditions included with Institutional Controls checklist.

VII. LANDFILL COVERS ☐ Applicable **X** N/A

Landfill was excavated in 2007 and 2011

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

IX. GROUNDWATER/SURFACE WATER REMEDIES **X** Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines **X** Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   X Good condition **X** All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   X Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   X Readily available **X** Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable **X** N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

C. Treatment System **X** Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   X Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   X Additive (*e.g.*, chelation agent, flocculent)___**Drewsperse**_____
   X Others____**SVE system – removed in 2007**_____
   X Good condition ☐ Needs Maintenance
   X Sampling ports properly marked and functional
   X Sampling/maintenance log displayed and up to date
   X Equipment properly identified
   X Quantity of groundwater treated annually__**See remarks**_____
   ☐ Quantity of surface water treated annually_____
   Remarks____**The P&T system was placed in stand-by in September 2014 to support a multi-year field demonstration in the OU-1** area The system is inspected monthly to ensure it remains operational._____

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

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

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

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

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

D. Monitoring Data	
1.	Monitoring Data **X** Is routinely submitted on time **X** Is of acceptable quality
2.	Monitoring data suggests: **X** 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 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. 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. The OU-1 landfill was excavated in two phases from 2007 through 2010 to support future redevelopment of the property by MDC.

The selected remedy for controlling contamination from the soils and groundwater at OU-1 is the collection, treatment, and disposal of groundwater. 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.

Presently the P&T system is in standby to support the EA Field Demonstration that was started in 2014 and was concluded in August 2018. This field demonstration was performed to evaluate the performance and viability of attenuation of cVOC in the OU-1 soil and groundwater. Evaluation of the effectiveness of EA required that the natural movement of groundwater occur through the treatment systems and simulates the conditions that would be present during a MNA remedy. The regulators approved that the P&T system could remain shut off until a remedy reevaluated process can be completed. The &T system is routinely inspected to ensure it remains operational if the need were to arise.

At this time, monitoring in OU-1 is being conducted based on an agreement developed by the Core Team (DOE 2019d). The monitoring program implemented during this interim period includes groundwater sampling, microbial sampling, and groundwater elevation measurements. Data collected to date shows decreases in the concentrations and mass of PCE and TCE in OU-1 groundwater, developed and sustained treatment zones based on geochemical and microbial data, and a stable (not expanding) plume.

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 Plan for the US Department of Energy, Mound, Ohio, Site* and. *OU-1 Pump-and-Treat System Operation and Maintenance Procedure*. The DOE also performs annual inspections on long-term remedies as called out in these plans. 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.
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. Data collected since the completion of the field demonstration shows the plume is stable (not expanding) and the concentrations and mass of the VOCs are decreasing.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. No opportunities for optimization were identified. Currently, DOE is pursuing an amendment to groundwater remedy in the OU-1 ROD .

FYR Interviews for IC and Groundwater Remedies

II. INTERVIEWS for IC and Groundwater Remedies (Check all that apply)

1. **O&M site manager** ___ **Melissa Lutz** _____ __ **Mound Site Lead** __ **2/13/2021**_
   Name Title Date
   Interviewed □ at site **X** at office Phone no. _____
   Problems, suggestions; **X** Interview form attached _____

2. **O&M staff** ____**Gary Weidenbach** _____ _ **Site Operations** _____ __**2/16/2021**
   Name Title Date
   Interviewed □ at site **X** at office □ by phone Phone no. _____
   Problems, suggestions; **X** Interview form attached _____

   O&M staff ____**Henry Becker** _____ _**Environmental Scientist**_____**2/11/2021**
   Name Title Date
   Interviewed □ at site **X** at office □ by phone Phone no. _____
   Problems, suggestions; **X** Interview form attached _____

   O&M staff ____**Rebecca Cato** _____ _ **Project Hydrogeologist**_____ __**2/16/2021**
   Name Title Date
   Interviewed □ at site **X** at office □ by phone Phone no. _____
   Problems, suggestions; **X** Interview form attached _____

Please respond to the following questions related to Mound site 2021 Five-Year Review relating to remedy performance and Operations & Maintenance. Please return by February 15, 2021. Your responses will be included in the FYR report.

Name: Melissa Lutz, Mound Site Lead, Navarro Engineering

1. What is your overall impression of the project? (general sentiment)

Continued development of the Mound site as the Mound Business Park continues to progress and be well received by the local community. With the exception of 18.55 acres, LM has transferred all remaining property to Mound Development Corporation since the last five-year review. Mound Development Corporation has sold and leased a number of property as well as constructed a new building for a current tenant.

O&M continues at the site with no issues, and there have been no Institutional Control violations identified.

2. Is the remedy functioning as expected? How well is the remedy performing?

The three groundwater remedies (Phase I; Parcels 6, 7 & 8; and Operable Unit 1) are functioning as intended. Based upon the successful results of the four-year enhanced attenuation field demonstration, a Record of Decision Amendment to the Operable Unit 1 remedy of Pump and Treatment is in process.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Phase I - concentrations of TCE and cis-1,2-DCE in BVA monitoring wells continue to remain below MCLs, indicating no impacts to the BVA, and there was an absence of upward trends since the last five year review.

Parcels 6, 7 & 8 - TCE concentrations greater than the MCL continued to be measured in seep 0601 and in downgradient monitoring well 0347. The concentrations of VOCs continue to be variable at a few locations, although recent data (since 2012) indicate decreasing VOC concentrations at most locations. There was an absence of upward trends since the last five year review.

Parcels 6, 7 & 8 - Tritium concentrations continue to be below the MCL and trends were all downward.

Operable Unit 1 - The areal extent of the parent compounds TCE and PCE remain stable and concentrations within the plume are low.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

There is not a continuous on-site presence at the site, however there is a routine presence by the LM contractor that involves weekly site visits, monthly water levels, and quarterly groundwater/seep sampling. An annual site walkdown/inspection is also conducted that includes an annual meeting with the property owners to review Institutional Controls. There is also good communication between the Mound Business Park management organization Mound Development Corporation.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

There have not been any significant changes in the O&M requirements, maintenance schedules or sampling routines in the last five years.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

There have not been any unexpected O&M difficulties or costs associated with the site since the last five-year review.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Since all seeps and downgradient wells were below the MCL for tritium in 2019/2020, and downward trends have been observed for all seeps and wells since 2011 and 2014, respectively; beginning in calendar year 2021, the tritium monitoring program will be discontinued.

8. Do you have any comments, suggestions, or recommendations regarding the project?

Continue to focus on the Operable Unit Record of Decision Amendment process, transfer of the remaining property, and completion of the vapor intrusion assessment.

Please respond to the following questions related to Mound site 2021 Five-Year Review relating to remedy performance and Operations & Maintenance. Please return to me by February 15, 2021. Your responses will be included in the FYR report.

Name: Gary Weidenbach

1. What is your overall impression of the project? (general sentiment)

Generally good overall. VI progress is slow.

2. Is the remedy functioning as expected? How well is the remedy performing?

Not my area to respond.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Not my area to respond.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

No, the site is unoccupied.
The Operations Lead visits weekly for routine items and to observe site conditions.
Sampling activities are also on a routine schedule of monthly/quarterly/semi-annually.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

The Pump & Treat operation was stopped in 2014 with concurrence of the Regulators and the remedy. A monthly checklist was developed and approved by the Regulators to assure the restart ability of the P&T.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

None to my knowledge.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

None to my knowledge.

8. Do you have any comments, suggestions, or recommendations regarding the project?

Unused Wells could be systematically removed in preparation of end of project activities.

Please respond to the following questions related to Mound site 2021 Five-Year Review relating to remedy performance and Operations & Maintenance. Please return to me by February 15, 2021. Your responses will be included in the FYR report.

Name: **Henry Becker** **Environmental Scientist, Navarro**

1. What is your overall impression of the project? (general sentiment)

Regarding O&M, LMS facilities and groundskeeping are maintained in good/excellent condition. The LMS footprint at the site is minimal (one work trailer, three storage containers, one pumphouse (in standby). Footpaths and routes of travel are kept open, however there could be a few more gravel surface improvements or short roadways to help minimize soil disturbance during sampling/monitoring activities. Well protective covers and wells are in good/excellent condition overall, with some that could be re-painted to prevent rust and improve aesthetics.

One noticeable new issue is that site use by the public is increasing. Some vehicle and bicycle tracks have been observed off-road on the site property. General to the whole Mound site is the amount of demolition debris (concrete and steel) and unremoved fixtures (fencing, stairs, abandoned overhead lines and poles) littering areas. A concerted effort to remove debris piles, unused concrete fixtures, fencing, abandoned wires and poles, and standing dead timber would greatly enhance site aesthetics and reduce hazards to workers and visitors.

Regarding remedy performance, the switch to enhanced Monitored Natural Attenuation (MNA) at OU-1 seems to be more effective and focused, while less maintenance intensive, less costly, less consumptive of resources, and requiring less regulatory focus (no effluent discharge to permit, monitor, and regulate). Other Long-Term Surveillance and Maintenance (LTS&M) sampling activities not related to OU-1 have shown a gradual improvement in sample results indicating that source materials and contaminant pathways have been adequately addressed.

2. Is the remedy functioning as expected? How well is the remedy performing?

Since the switch to MNA, the site's OU-1 area has seen a promising decline and degradation in the contaminants of concern. Sample results indicate that conditions are good for a continued enhanced attenuation of volatile organic contaminants through dehalogenation and biodegradation.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

My impression is sampling data indicates that the rates of decline in OU-1 contaminants through MNA far surpasses the rates of decline seen during the application of the previous remedy (pump and treat). It may be realistic to presume that OU-1 contaminants will be below their Maximum Contaminant Levels (MCLs) within 5 to 10 years, and that monitoring infrastructure (wells, well guards, concrete well pads, and well access routes) may be considered for removal. Likewise, is my impression for non-OU-1 LTS&M monitoring.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

LMS does not provide a continuous physical O&M presence at the mound site. However, management and responsibility structures are in place to provide for inspections, repairs, and improvements. The site is generally visited weekly by a part-time LMS facility manager, and monthly by LMS core team staff and LMS samplers. During their visits and work activities the LMS staff are obliged to observe and report any abnormal conditions or activities through their leadership chains which also may notify local authority or municipal points of contact.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

I haven't seen any major changes in site O&M or sampling routines except for eliminating the need for outfall monitoring due to the change in OU-1 remedy from pump and treat to MNA. Some LTS&M wells have been reduced in sampling frequency due to less or more seasonally affected results, while likewise some newer wells have been added to provide more focused monitoring of some areas.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Paths to surface water seep sample locations require regular mowing, weed eating, and dead tree clearance. Some soil disturbance restoration has been necessary due to off-road truck travel for sampling well access. The part-time occupied trailer (T-16) requires regular maintenance and is aging so that it may require more frequent repairs to be suitable for continued use.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

LMS staff always look for opportunities to optimize O&M and sampling efforts through staffing and work efficiencies. The site is no longer continually occupied by LMS staff, and sampling activities are accomplished by two or three "teams" of one sampler each. LMS facilities have been reduced from two to one trailer, and from four to three storage containers. Well installation, maintenance, and plugging/abandonment needs have been self-performed by LMS Geoprobe and scientist staff to minimize costs and layers of responsibility, and to reduce impact from drilling equipment use. Future sampling and maintenance projects are considering continued self-perform completion due to this demonstrated improvement in quality and efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

My four main suggestions are as follows:

1. Daily site use by the public is slowly increasing. With this welcomed use comes some concerns including; site conditions and public safety, impact from use (some dirt bike, ATV, and bicycle tracks have been seen), and security. Property conditions and regular police or security patrols may need to be considered.

2. Remove legacy construction/demolition debris site-wide to improve safety, environmental impact, and aesthetics.

3. Attend to some ecological needs at the site with ecologically oriented maintenance activities to reduce invasive honeysuckle by spraying and cutting. Improve soil retention and grass density by conducting prescribed burns. Improve safety by removing standing dead timber.

4. Maintain wells by ensuring their protective covers and bollards are undamaged and painted when necessary.

Interview questions for the 2021 CERCLA FYR, Becky Cato - 2/16/2021

1. What is your overall impression of the project? (general sentiment)

The project is going well. Sampling and O&M activities at the site continue to be performed as scheduled. The remedies continue to function as intended.

2. Is the remedy functioning as expected? How well is the remedy performing?

The IC remedies for all the areas of the site are functioning as intended as shown by annual IC inspections and review.

The MNA groundwater remedies for Phase I and Parcels 6, 7 & 8 are functioning as expected as routine sampling provides adequate data to ensure that the downgradient BVA is not adversely affected by impacted groundwater originating from the Mound site. Concentrations of the COCs have been decreasing or have become stable. Most locations have concentrations less than the MCLs. Data are collected and review in a timely manner and allow for adequate notification if changes were to occur.

The OU-1 P&T system is presently in standby mode to allow the treatment zones that were developed during the Enhanced Attenuation Field Demonstration to remain unaltered until such time it is determined if the remedy to address groundwater in OU-1 can be modified to enhanced attenuation or will remain the currently selected hydraulic containment using P&T. The process to request a remedy change is ongoing and is expected to be finalized in the near future. Prior to placing the OU-1 P&T system in standby, the system was functioning as intended and is tested monthly to ensure that it can be made operational if needed. Routine sampling in OU-1 shows that the concentrations of PCE and TCE has decreased and most locations are less than the MCLs. The generation of cDCE and VC has occurred as expected and concentrations of those contaminants have remained low. The plume has been stable with no expansion and a reduction and overall concentration and mass.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

The data for Phase I show that VOC-impacted groundwater is not adversely affecting the BVA and decreasing concentrations have been observed in the bedrock wells where TCE is monitored.

The data for Parcels 6, 7, and 8 show that tritium- and VOC-impacted groundwater is not adversely affecting the BVA. Tritium levels continue to decrease in both the groundwater and seeps since the remediation activities on the Main Hill and all locations have been less than the MCL. VOC concentrations have been variable; however, none of the locations exceeded the trigger values for TCE in the source wells, which had occurred periodically previously. More frequent sampling (quarterly) continues to be performed to better monitor any changes.

The results of the OU-1 EA Field Demonstration are encouraging, showing that the treatment zones could be sustained and reduce the concentrations of the parent compounds PCE and TCE

as well as the daughter products, cDCE and VC. Data show the dissolved TCE and PCE plumes have decreased in size and mass, the distribution of cDCE is observed where expected and at low concentrations, and limited VC production is occurring near the treatment zones.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

There is no continuous on-site presence at the Mound Site. Project personnel are typically at the site at least twice a month to perform inspections and measure static water levels in OU-1. Groundwater sampling is performed quarterly OU-1 and Parcels 6, 7 & 8 and semiannual for Phase I. The IC inspection is performed annually.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

There have not been any significant changes to the O&M requirements. The monitoring for OU-1 has been modified from that in the O&M Plan due to the performance of the EA field demonstration and the P&T system has been placed in standby mode. These actions were approved by the Core Team.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

There have not been any unexpected O&M difficulties or costs.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

In Phase I, a new well (P064) was installed to better monitor the discharge of the bedrock groundwater into the BVA. It was decided to discontinue monitoring of BVA well 0400, 0402, and P033.

In Parcels 6, 7, and 8, it was requested to discontinue monitoring of tritium based on levels being less than the MCL and downward trends in all the seeps and groundwater wells. The regulators requested additional data to support that these levels were sustained. The review of this data did not occur during this FYR period but is anticipated to be approved in the near future.

8. Do you have any comments, suggestions, or recommendations regarding the project?

None.

Rebecca Cato
Mound Site Project Hydrogeologist

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Appendix C

Site Inspection Photographs

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Contents

Figures

Tables

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C1.0 Parcels 6, 7, and 8 Remedy Wells and Seeps

Table C-1 and Figure C-1 list and identify the locations of the Parcels 6, 7, and 8 monitoring wells. Table C-2 contains photos of all wells and seeps. All of the Parcels 6, 7, and 8 wells were locked and in good condition and the seeps were accessible.

Table C-1. Parcels 6, 7, and 8 Monitoring Wells and Seeps

Well/Seep ID	Located in Parcel 8	Offsite
0118		X
0124		X
0126		X
0138		X
0315	X	
0346	X	
0347	X	
0379	X	
0386		X
0387		X
0389		X
0392		X
Seep 0601	X	
Seep 0602	X	
Seep 0605		X
Seep 0606		X
Seep 0607		X

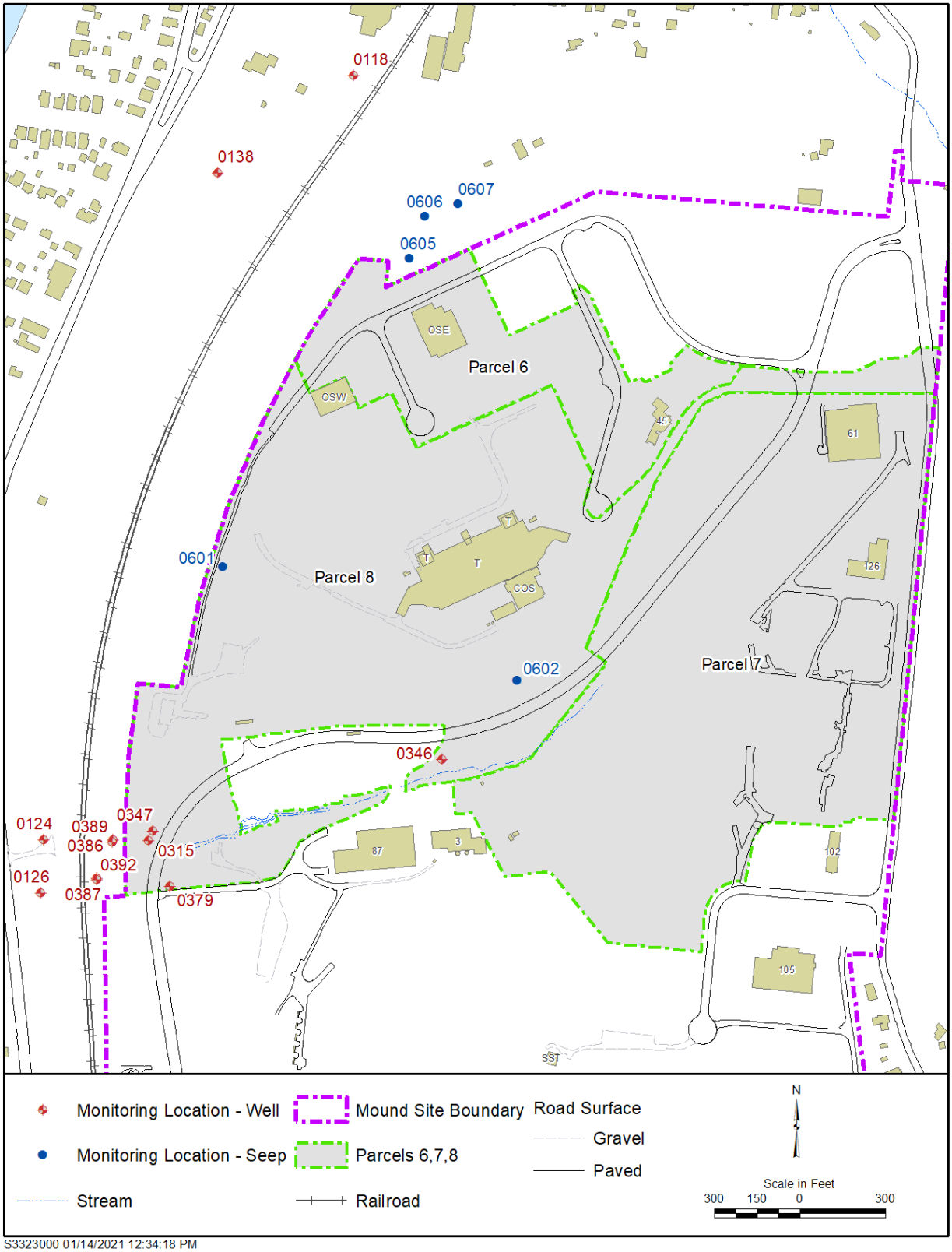

Figure C-1. Parcels 6, 7, and 8 Groundwater and Seep Monitoring Locations

Table C-2. Photos of Parcel 6, 7, and 8 Wells and Seeps

Well 0118

Well 0124

Well 0126

Well 0138

Well 0315

Well 0346

Well 0347

Well 0379

Well 0386

Well 0387

Well 0389

Well 0392

Seep 0601

Seep 0602

Seep 0605

Seep 0606

Seep 0607

Seeps 0605-0606-0607 Stairs

C2.0 OU-1/Parcel 9 Wells

Table C-3 and Figure C-2 list and identify the locations of the OU-1 monitoring wells, including those monitoring wells added as part of the OU-1 Field Demonstration project that was initiated in 2014. Table C-4 contains photos of all wells. All wells were locked and in good condition.

Table C-3. OU-1 Monitoring Wells

OU-1 Performance Monitoring Well IDs	OU-1 Field Demonstration Monitoring Well IDs
P015	0317
P027	0379
P031	0451
P053	0452
P054	P043
P056	P045
0305	P046
0410	P057
0416	P058
0417	P059
0418	P060
0419	P061
0422	P062
0423	P063
0424	
0425	
0449 – extraction well	
0450 – extraction well	

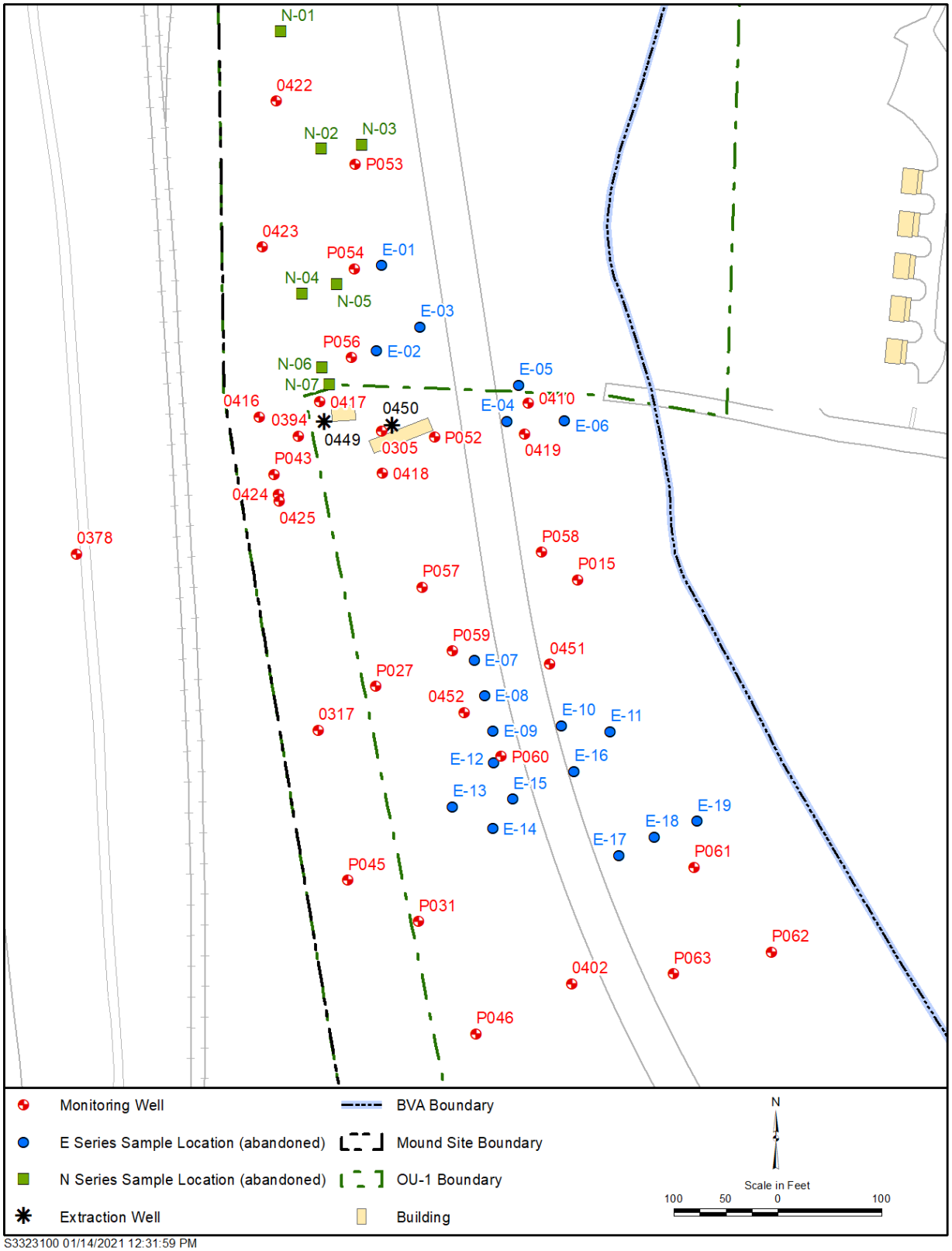

Figure C-2. OU-1 Monitoring and Extraction Wells

Table C-4. Photos of OU-1 Wells

Well P015

Well P027

Well P031

Well P053

Well P054

Well P056

Well 0305

Well 0410

Well 0416

Well 0417

Well 0418

Well 0419

Well 0422

Well 0423

Well 0424

Well 0425

Well 0449

Well 0450

Well P043

Well P045

Well P046

Well P052

Well P057

Well P058

Well P059

Well P060

Well P061

Well P062

Well P063

Well 0317

Well 0451

Well 0452

C3.0 Phase I Remedy Wells and Seeps

Table C-5 and Figure C-3 list and identify the Phase I groundwater monitoring wells and one seep. Table C-6 contains photos of all wells and the seep. All wells were locked and in good condition.

Table C-5. Phase I Monitoring Wells and Seeps

Well/Seep No.	Located in Parcel				
	4	IA	IB	IC	9
Well P033				X	
Well P064				X	
Well 0353					X
Well 0400				X	
Well 0402					X
Well 0411			X		
Well 0443			X		
Well 0444	X				
Well 0445				X	
Seep 0617			X		

Note:
Sampling of wells P033, 0400 and 0402 was discontinued in 2017.

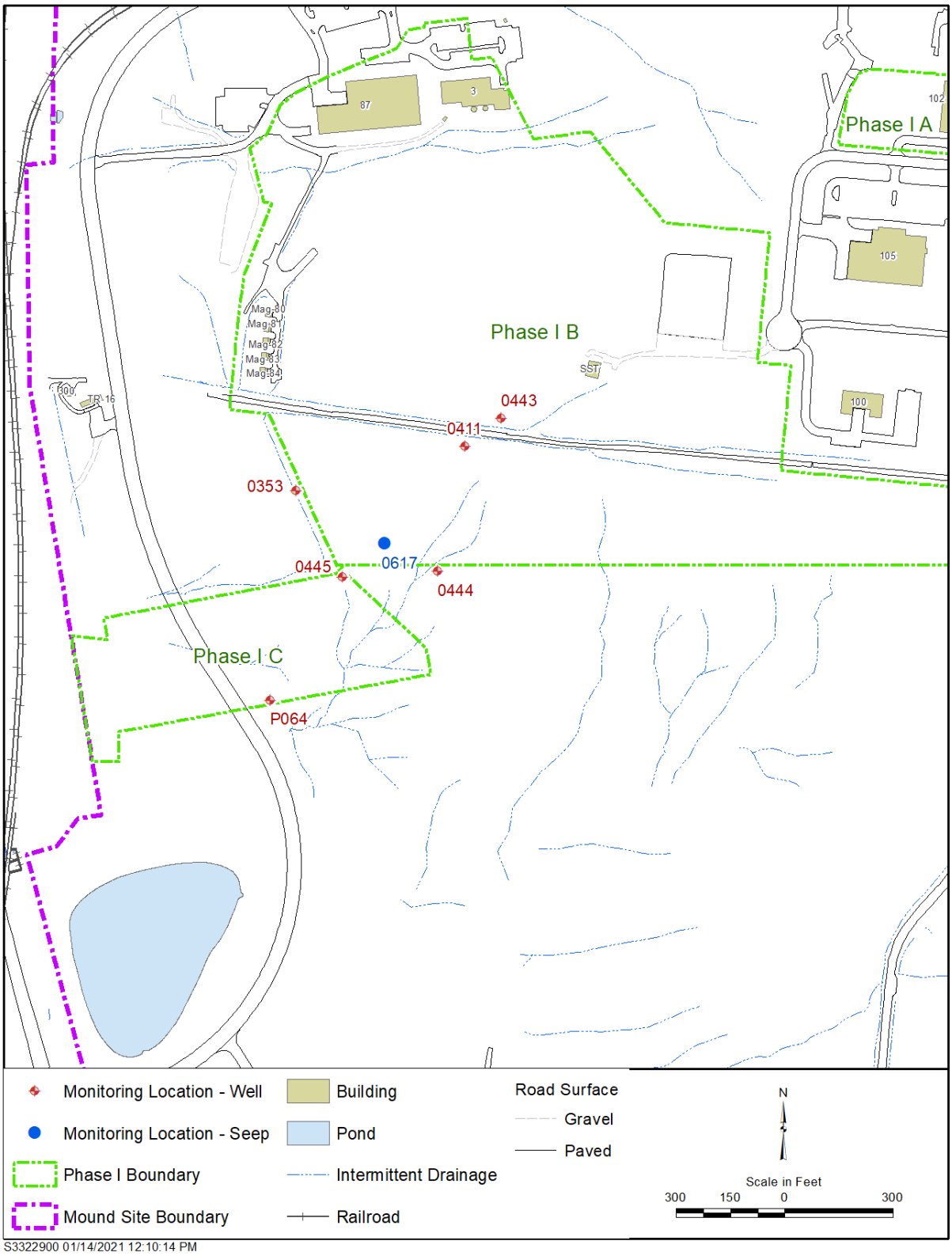

Figure C-3. Phase I MNA Remedy Monitoring Well Locations

Table C-6. Photos of Phase I Wells and Seeps

Well P033

Well P064

Well 0353

Well 0400

Well 0402

Well 0411 and Walkway

Well 0443

Well 0444

Well 0445

Seep 0617

C4.0 Aerial Photo

The following photo (Figure C-4) taken for the 2021 FYR shows the state of the Mound site with the ROD parcels outlined in white.

Figure C-4. March 2021 Aerial View of the Mound Site Showing ROD Parcel Boundaries

DOE-LM Responses to EPA Comments

Fifth Five-Year Review Report for the Mound Site
Miamisburg, Ohio, Dated May 2021

	EPA Comment	DOE LM Response
1	**Executive Summary, Page x, Issue**: **Vapor Intrusion in OU-1/Parcel 9:** Please confirm the Milestone date of 11/27/2021 is valid given the short time period from the likely date of the final FYR?	The milestone date was revised to December 31, 2021, to account for development and review of the Proposed Plan by the regulators.
2	**Section 3.0, Progress Since the Last FYR:** As noted in the FYR guidance template, this section should include two tables, one for Protectiveness Determinations/Statements from the 2016 FYR and another table for Status of Recommendations from the 2016 FYR.	Table 4, "Protectiveness Determinations/ Statements from the 2016 FYR," was added as recommended and in compliance with the guidance template. The existing Table 5, "Status of Recommendations from the 2016 FYR," was reconfigured to add two columns in compliance with the guidance template.
3	**Section 4.1, Community Notification, Involvement & Site Interviews:** This section does not include a statement that explains where the results of the review and FYR report are being made available to the public consistent with the FYR Template. It is recommended that this section be revised to include such a statement and clarify that the public was informed where the results of the FYR and the FYR report could be accessed.	Text was added to Section 4.1. to clarify that the public was informed in the original public notice issued in November 2020 that the final FYR report would be available to the public on the Mound site webpage on the LM public website. LM will issue a second public notice when the report is approved by EPA.
4	**Section 4.4.1, Phase I, under the Mann-Kendall trend analysis paragraph:** EPA recommends indicating that the purpose of the M-K test is used to analyze data collected over time for consistently increasing or decreasing trends.	A statement was added to Sections 4.4.1 and 4.4.2 indicating the purpose of performing the Mann-Kendall test is to determine if there are trends in the data and identify if they are increasing or decreasing.
5	**Section 4.4.3, Operable Unit 1:** This section should include statements regarding the impacts of off-site (i.e., non-Mound) activities/projects on the demonstration project. Additionally, a statement should be added that the decision not to immediately restart the pump-and-treat system after the demonstration project was based upon the data collected during the demonstration project indicating that enhanced attenuation may be a viable remedy as well as the stated intention not to alter the current treatment zones.	Text discussing the occurrence of the offsite large-scale dewatering project was added to the text. A statement was added that the decision not to immediately restart the pump-and-treat system after the demonstration project was based on (1) the data collected during the demonstration project indicating that enhanced attenuation may be a viable remedy and (2) the stated intention not to alter the current treatment zones
6	**Section 4.5.2, Changes in Toxicity and Other Contaminant Characteristics:** The section needs to provide specific references for the current toxicity values stated. It appears only a general reference was provided.	References for the toxicity values have been added to the text.
7	**Section 4.5.2, Changes in Toxicity and Other Contaminant Characteristics:** This section notes that many slope factors or toxicity values have changed and states that these changes do not affect remedy protectiveness. However, the section does not explain why the changes do not affect remedy protectiveness. Please include the justification as to why these changes do not affect remedy protectiveness.	Explanations have been included regarding the effects the changes to the slope factors and toxicity values may have on remedy protectiveness.

DOE-LM Responses to EPA Comments

Fifth Five-Year Review Report for the Mound Site
Miamisburg, Ohio, Dated May 2021

	EPA Comments	DOE LM Responses
8	**Section 4.5.4.3, Emerging Contaminants:** This section should summarize the PFOS/PFOA screening evaluation conducted and its conclusions. PFAS are anti-corrosive and were used in uranium enrichment, metal plating, etc. The FYR should explain whether these uses are applicable to Mound and if they were evaluated.	Text outlining the expansion of the emerging contaminants PFOS/PFOA to include PFAS was added to Section 4.5.4.3. The results of the previous PFOS/PFOA screening evaluation, performed for the 2016 FYR, were summarized in this section. Also, the evaluation of PFAS was added to Question C for Parcels 6, 7, and 8 and details of this evaluation were outlined in Section 6.0.
9	**Section 4.5.4.3, Emerging Contaminants:** The table and text should acknowledge that 1,4-dioxane was used historically in liquid scintillation cocktails and discuss whether liquid scintillation counting was used for radiological analyses at Mound. It is recommended that this section be revised to include this information and to clarify the potential for presence of this fluid at the site.	Text outlining the historical use of 1,4-dioxance and perchlorate was added to Section 4.5.4.3. Also, the evaluation of these two constituents was added to Question C for Phase I, OU-1, and Parcels 6, 7, and 8. Details of this evaluation were outlined in Section 6.
10	**Section 5.1 Parcels D, H, 3, and 4, under Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid? The second paragraph states "The VI exposure pathway was not identified in the RRE and a determination on complete exposure pathways for VI at the Mound site is still underway." Please indicate that vapor intrusion is discussed in more detail in paragraph, 4.5.4.3 New Contaminants or Contaminant Sources, Vapor Intrusion above. Same comment pertains to **Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?	Reference to Section 4.5.4.3 was added as suggested.
11	**Section 5.2, Phase I (A, B, and C):** Same comment as Section 5.1 above, which applies to both Question B and Question C. Refer the reader back to paragraph 4.5.4.3, New Contaminants or Contaminant Sources, Vapor Intrusion for more detail.	Reference to Section 4.5.4.3 was added as suggested**.**
12	**Section 5.3, Parcels 6, 7, and 8:** Same comment as Section 5.1 above, which applies to both Question B and Question C. Refer the reader back to paragraph 4.5.4.3, New Contaminants or Contaminant Sources, Vapor Intrusion for more detail.	Reference to Section 4.5.4.3 was added as suggested**.**
13	**Section 5.4, OU-1/Parcel 9:** Same comment as Section 5.1 above, which applies to both Question B and Question C. Refer the reader back to paragraph 4.5.4.3, New Contaminants or Contaminant Sources, Vapor Intrusion for more detail.	Reference to Section 4.5.4.3 was added as suggested**.**
14	**Section 6.0, Issues, Recommendations, and Other Findings, Table 18:** Issues Identified, 3. Emerging contaminants (perchlorate and 1,4-dioxane): Same comment as Executive Summary above. What type of evaluation will be completed? This section should provide some context as to what additional evaluations will be conducted.	Details regarding the evaluations that will be conducted regarding emerging contaminants have been included in the Issues and Recommendations table**.**

DOE-LM Responses to EPA Comments

Fifth Five-Year Review Report for the Mound Site
Miamisburg, Ohio, Dated May 2021

	EPA Comments	DOE LM Responses
15	**Section 6.0, Issues, Recommendations, and Other Findings:** The text does not indicate if Other Findings were noted. Please clarify. EPA suggests the finding relating to • removing ICs from the centerline of Mound Road be added to this section with an explanation that it does not impact current or future protectiveness of the remedies selected. • Additionally, the possibility of pursuing sale/transfer of Parcel 9 prior to the ROD amendment should be discussed and the DOE's intent of applying Institutional Controls as a condition of sale/transfer to manage the VI exposure pathway until a remedy is selected and implemented.	A new subsection was added regarding other findings and information, and the information about the two suggested findings was added to Section 6.0.
16	**Section 7.0, Protectiveness Statements:** A sitewide protectiveness statement is also required in this section.	A sitewide protectiveness was added to the report.
	The following comments were entered into the Word file edited by EPA.	
1	**Executive Summary:** Multiple fonts are being used. Please ensure font is consistent throughout the document to avoid unintentional highlighting of various text.	LM corrected inconsistent fonts in the document.
2	**Page viii, first bullet under paragraph, "This fifth FYR determined the following:"** •The institutional control (IC) remedies for Parcels D, H, 3, and 4 … "Reviewer added the word, "currently" before protective."	The text was revised as suggested.
3	**Summary Form, pages xi and xii:** Included edits to the form and the comment: This information should be moved/included in Section 7 and is no longer required as part of the summary form given the information is duplicative. Additionally, a Site-Wide Protectiveness Statement should be included.	The information from the summary form was incorporated into later sections of the report. Additionally, a sitewide protectiveness statement was added.
4	**Table 4, page 14:** Please add a column to Table 4 for "Completion Date (if applicable)". The 2nd recommendation was completed and a date in month/day/year should be included.	Columns were added to the table to be consistent with the EPA template format.
5	**Site Inspections on page 19 paragraph on physical inspection waived due to COVID:** Please include a statement that EPA may conduct a physical site inspection once COVID-19 restrictions have been lifted.	The statement "EPA may conduct a physical site inspection when COVID-19 restrictions have been lifted" was added as suggested.
6	**Section 7. Protectiveness Statements:** As the site has achieved "construction completion", please add a Sitewide protectiveness statement.	A sitewide protectiveness statement was added to the report.
7	**Section 7.1 Parcel D, H, 3 and 4 Remedy:** Reviewer added "currently" before "protective."	Text was revised as suggested.

DOE-LM Responses to Ohio EPA Comments

Ohio EPA Review of the "Draft Fifth Five-Year Review Report, dated May 17, 2021" for the Mound Site, Miamisburg, Ohio

	Ohio EPA Comment	DOE LM Response
1	**Comment 1, Section 4.5.3: Table 15** describes the changes to exposure parameters for risk calculations. The updated worker skin surface area for soil is listed as 3,470 cm2, however, it should be 3,527 cm2 in accordance with the 2014 U.S. EPA Office of Solid Waste and Emergency Response (OSWER) memo titled "Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors."	The worker skin surface area for soil was corrected as noted in the comment. (The "Table 15" mentioned by Ohio EPA in this row is now "Table 16, Summary of Changes to Exposure Parameters for Risk Calculations.")
2	**Comment 2, Section 4.5.4.2:** In the 1997 Residual Risk Evaluation Methodology, the risks were calculated for construction workers. It is not clear if a current risk evaluation has been conducted for construction worker exposure pathways including direct contact with soil and ground water as well as inhalation of vapors in a trench. Please clarify how the risk to construction/excavation workers will be mitigated during potential construction activities at the site.	Section 4.5.4.2, "Exposure Pathways," discusses the pathways that are included in the Residual Risk Evaluation and then outlines those pathways that have been eliminated or added as the project has progressed. Dermal contact is a pathway that has been and continues to be included under the construction worker scenario. In the "Addition of the VI pathway" bullet list item, text has been added to explain that the RREs performed for each area took into consideration inhalation of vapors emitted from soil excavated during construction and that the levels were determined to be acceptable. Also, text has been added to explain that exposure of workers to vapors emitted from contaminated groundwater is considered to be incomplete due to the depth of groundwater (greater than 25 feet below the ground surface). In addition, a new "Elimination of the groundwater pathway through contact" bullet list item was added in Section 4.5.4.2. It is not expected that workers would have regular contact with groundwater because the depth to groundwater at the site is typically greater than 25 feet below the ground surface.
3	**Comment 3, Section 4.5.4.3: Table 16 on page 50 (pdf page 66)** lists a summary of the emerging contaminants that were evaluated for use at the site. The table does not appear to include n-nitroso-dimethylamine (NDMA) which is included on the U.S. EPA List of Emerging Contaminants. Please provide a discussion in the FYR that describes if NDMA was used at the Mound site and if any further action is needed to evaluate it.	NDMA was added to the table of emerging contaminants reviewed for this FYR. (The "Table 16" mentioned by Ohio EPA in this row is now "Table 17, Emerging Contaminant Evaluation for the Mound Site.")