

Corrective Measures Study Report

Chemours Montague Works
Montague, Michigan

Submitted on behalf of:
The Chemours Company FC, LLC

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Acronym and Abbreviation List

Acronym/Abbreviation	Explanation
AECOM	AECOM Technical Services Inc.
AOC	Area of Concern
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CACO	Corrective Action Consent Order
CaCO ₃	Calcium Carbonate
CaF ₂	Calcium Fluoride
CAO	Corrective Action Objective
CD	Chloroprene
CFC-11	Trichlorofluoromethane
CFC-113	1,1,2-Trichlorotrifluoroethane
CFC-12	Dichlorodifluoromethane
CFC-13	Chlorotrifluoromethane
CFC-22	Chlorodifluoromethane
CFCs	Chlorofluorocarbons
Chemours	The Chemours Company FC, LLC
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CMS Work Plan	Corrective Measures Study Work Plan
COPC	Constituents of Potential Concern
DuPont	E. I. du Pont de Nemours and Company
EC50	Median Effective Concentration
EGLE	Michigan Department of Environment, Great Lakes, and Energy
Eh	Redox Potential
EPA	U.S. Environmental Protection Agency
FAV	Final Acute Values
gpm	Gallons per Minute
GSI	Groundwater to Surface-Water Interface
GWTS	Groundwater Treatment System
HCl	Hydrochloric Acid
I&ECs	Institutional and Engineering Controls
IRM	Interim Remedial Measure
LTM	Long-Term Maintenance
MCL	Maximum Contaminant Level
MCS	Media Cleanup Standard
MDEQ	Michigan Department of Environmental Quality
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MNA	Monitored Natural Attenuation
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
Oxychem	Occidental Chemical Company
PCE	Tetrachloroethylene
Ra	Radium
RBSLs	Risk-Based Screening Levels
RCRA	Resource Conservation and Recovery Act
Restrictive Covenant	Uniform Environmental Covenant Agreement
RI	Remedial Investigation

Acronym/Abbreviation	Explanation
Rn	Radon
SPLP	Synthetic Precipitation Leaching Procedure
SSVIAC	Site-Specific Volatilization to Indoor Air Criterion
SVOC	Semi-Volatile Organic Compound
TCDD	Tetrachlorodibenzo-para-dioxin
TCE	Trichloroethylene
TCLP	Total Characteristic Leaching Procedure
TEQ	Toxicity Equivalence
VIAP	Vapor Intrusion to Indoor Air Pathway
VOC	Volatile Organic Compound
WMU	Waste Management Unit

Executive Summary

AECOM Technical Services, Inc. (AECOM) has prepared this Corrective Measures Study (CMS) report on behalf of The Chemours Company FC, LLC (Chemours) for the Chemours Montague site located in Montague, Michigan. This CMS report was prepared in accordance with the *Corrective Measures Study Work Plan* (CMS WP) and comments received from Michigan Department of Environment, Great Lakes, and Energy (EGLE), and fulfills the requirement of Section 8.4 of the Corrective Action Consent Order (CACO) effective on July 9, 2024.

The Waste Management Units (WMUs) and Areas of Concern (AOCs) evaluated in this CMS were identified in the CMS WP as well as in the EGLE comments. An additional unit (Copper Catalyst Release Area) was identified by EGLE during a site visit in 2024.

The objectives of this CMS are to evaluate and propose corrective measure alternatives that are protective of human health and the environment for the CMS WMUs, AOCs, and groundwater plume at the Montague site. Corrective measure technologies evaluated include institutional controls (including site access controls, deed, and water use restrictions), groundwater monitoring and monitored natural attenuation (MNA), groundwater containment and treatment, capping, on-site treatment, off-site disposal, and consolidation.

This evaluation focuses on the three core elements of a CMS:

- Impacted media are described, and pathways and potentially unacceptable exposures are identified in an exposure assessment. This assessment forms the basis for the Corrective Action Objectives (CAOs) and Media Cleanup Standards (MCSs).
- Technologies are identified and screened for their ability to mitigate potentially unacceptable exposures.
- The technology (or combination of technologies) that meets the CAOs and best fits the selection criteria and future use is chosen.

Consistent with the Resource Conservation and Recovery Act (RCRA) guidance, several technologies were identified and evaluated using the following threshold criteria:

- Protect human health and the environment.
- Control sources.
- Meet CAOs and MCSs.
- Comply with applicable standards for management of wastes.

The technologies meeting the threshold criteria were then developed into unit-specific corrective measure alternatives and evaluated further considering several decision factors (balancing criteria). The decision factors used for the evaluation were those specified in the approved CMS WP. These criteria are consistent with U.S. Environmental Protection Agency (EPA) RCRA guidance documents (EPA, 1994 and 2000).

The decision factors specified in the permit are as follows:

- Long-term reliability and effectiveness
- Reduction in the toxicity, mobility, or volume of wastes
- Short-term effectiveness
- Implementability
- Cost
- State and community acceptance

The performance of each corrective measure alternative with respect to the decision factors was used to select effective corrective measure alternatives meeting the threshold criteria. The selected corrective measure alternatives are as follows:

- Northeast Landfill: Institutional and Engineering Controls (I&ECs), groundwater monitoring, and surface waste removal and soil grading.
- North Landfill: I&ECs, groundwater monitoring, and surface waste removal and soil grading.
- Bury Pit Landfill: I&ECs, groundwater monitoring, and surface waste removal and soil grading.
- Pierson Creek Landfill: I&ECs, groundwater monitoring, and a geotextile cap.
- Pierson Creek: I&ECs, groundwater monitoring, and MNA with mixing zone determination.
- Basin Sludge Area: I&ECs, groundwater monitoring, and off-site re-use.
- Waste Neoprene Landfill: I&ECs, groundwater monitoring, and off-site re-use.
- Lime Pile: I&ECs, groundwater monitoring, and off-site re-use; the underlying material will be characterized after the lime by-product has been removed to the extent possible and further corrective measures applied if necessary.
- Mirror Lake: I&ECs, groundwater monitoring, and on-site consolidation with habitat restoration. On-site consolidation is currently underway and is not part of the cost calculation.
- Calcium Fluoride (CaF₂) Basin: I&ECs, groundwater monitoring, ongoing maintenance of the fencing, an improvement to the surface cover, and an evaluation of leachability with subsequent modifications to the cover system if needed.
- Groundwater Plume from Former Manufacturing Area: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- National Pollutant Discharge Elimination System (NPDES) Impoundments and Corrosive Treatment: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- West Railcar Un/Loading Area: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- Copper Catalyst Storage Area: I&ECs and select removal of surface material for off-site disposal.

The total cost for the proposed remedies is approximately \$4.1 million in capital cost and \$9.2 million in annual operation and maintenance cost.

1.0 Introduction/Purpose

AECOM Technical Services, Inc. (AECOM) has prepared this Corrective Measures Study (CMS) report on behalf of The Chemours Company FC, LLC (Chemours) for the Chemours Montague site located in Montague, Michigan. The site location is shown on Figure 1-1. This CMS report was prepared in accordance with the approved *Corrective Measures Study Work Plan* (CMS WP; AECOM, 2018) and comments regarding the CMS WP received from Michigan Department of Environment, Great Lakes, and Energy (EGLE) in a letter dated November 12, 2019. Additional correspondence and discussion between Chemours and EGLE regarding these comments took place involving requests for additional investigations by EGLE. Coincident with those discussions, EGLE and Chemours negotiated a Corrective Action Consent Order (CACO), which received its final approval signature on July 9, 2024. Section 8.4 of the CACO describes the CMS and supporting work regarding evaluation of vapor intrusion. The CMS specified that “the CMS shall include a comprehensive summary of the investigation data and a detailed evaluation of potential corrective measures, including costs for the WMUs and AOCs.”

The waste management units (WMUs) and areas of concern (AOCs) evaluated in this CMS are listed and summarized in Table 1-1. Locations of the units are shown on Figure 1-2.

1.1 Background

The Montague site is a former chemical manufacturing facility located in Muskegon County, Michigan. This site is subject to corrective action under Part 111, Hazardous Waste Management, of the Michigan Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), and its administrative rules. Corrective action has been performed at the facility under the regulatory review of the Michigan Department of Environmental Quality (MDEQ) and the Michigan EGLE (the successor agency to MDEQ¹). The site investigations were completed in accordance with the protection standards and relevant processes of MDEQ Part 201 to meet the corrective action obligations under Part 111 with MDEQ/EGLE providing oversight as necessary. Additional details of the project chronology and key site history are provided in Table 1-2.

1.2 CMS Report Objectives

The objectives of this CMS are to evaluate and propose corrective measure alternatives that are protective of human health and the environment for the units identified in Table 1-1. This report presents the approach and results of the remedy evaluations conducted in accordance with current U.S. Environmental Protection Agency (EPA) guidance documents and state regulations.

¹ The Michigan Department of Environmental Quality (MDEQ) re-organized in 2019 and was renamed as the Michigan Department of Environment, Great Lakes, and Energy (EGLE) effective April 22, 2019. In this report, MDEQ is used for references prior to April 2019 and EGLE after that date.

1.3 Report Organization

Based on the outline proposed in Section 7.0 of the CMS WP and in accordance with EPA guidance, the remainder of this report is organized into the following sections:

- Section 2.0 describes the site setting and current site conditions.
- Section 3.0 describes the units evaluated in the CMS as well as additional data collection activities conducted to support CMS remedy evaluations.
- Section 4.0 presents the CMS approach including the Corrective Action Objectives (CAOs) and applicable Media Cleanup Standards (MCSs).
- Section 5.0 describes the development and evaluation process of corrective measure alternatives and the selected corrective measure for each CMS unit.
- Section 6.0 presents the evaluation of corrective measures alternatives specific to each WMU/AOC.
- Section 7.0 presents the cost estimate for the selected remedies, including capital costs and post-construction costs, and the general schedule for corrective measures implementation.
- Section 8.0 summarizes the recommended alternative(s) for each WMU/AOC.
- Section 9.0 contains the references cited in this report.

2.0 Description of Current Conditions

The Chemours Montague facility is located in Muskegon County, Michigan, approximately two miles southwest of the city of Montague (see Figure 1-1). The plant property consists of approximately 1,330 acres and is bounded by forested, agricultural, residential, and former industrial properties. The property to the east is owned by Occidental Chemical Company (Oxychem). The former operating part of the facility is located about one mile north of White Lake and 1.5 miles east of Lake Michigan.

2.1 Site History

The Montague property was purchased by E. I. du Pont de Nemours and Company² (DuPont) in the 1940s. In 1955, DuPont built the Montague facility, and it became fully operational in 1956. Initially, the facility produced acetylene and neoprene. Later, various formulations of Freon[®] (chlorofluorocarbons or CFCs) were manufactured at the site, and the acetylene and neoprene facilities were demolished.

In approximately 1955, an adjacent Union Carbide facility began manufacturing acetylene, which produced a lime by-product. The Union Carbide lime by-product was stored in a low-lying area located approximately 1,250 feet due south of the main DuPont operating area. From 1955 to 1957, DuPont manufactured its own acetylene on-site using a process that did not generate a lime by-product. In 1961, DuPont purchased Union Carbide's plant and operated it for approximately 11 additional years.

DuPont began manufacturing neoprene at the Montague facility in 1956 using acetylene and hydrochloric acid (HCl) as the two main raw materials. In addition to neoprene, the facility produced various polymers by emulsion polymerization, including chlorinated monomers, chloroprene (CD), and latex. These operations were terminated in 1972.

Freon products were manufactured at the facility starting in 1965 until 1995. Freon products included trichlorofluoromethane (CFC-11), dichlorodifluoromethane (CFC-12), chlorotrifluoromethane (CFC-13), chlorodifluoromethane (CFC-22), and 1,1,2-trichlorotrifluoroethane (CFC-113).

The Montague facility ceased manufacturing operations in 1996, and the manufacturing facility was demolished in 1998. The only structures that remain support the site's groundwater pump-and-treat system. In 2015, Chemours was created by DuPont as a separate business that owns and has the environmental liability for this site.

2.2 Hydrogeologic Setting

The Montague property is north of White Lake and east of Lake Michigan and portions of the property are adjacent to these lakes. Most of the property has little topographic relief; however, there is considerable variation in ground surface elevation (40 to 50 feet) near Pierson Creek, Mirror Lake, White Lake, and the dunes near the Lake Michigan bluff.

Based on numerous past soil borings and monitoring wells, the upper-most 100 to 150 feet of sediment at the site is composed primarily of unconsolidated, sandy glacial outwash. With increased depth, layers of silts and clays become more common. These silts and clays are believed to be lake-deposited formation. The sand is typically

² DuPont restructured in 2015, creating a new legal entity, The Chemours Company FC, LLC (Chemours). The Montague site was transferred to Chemours in July 2015. In this report, DuPont is referenced as the site owner prior to July 2015 and Chemours after July 2015.

characterized as well-sorted with occasional gravel layers leading to relatively high hydraulic permeability. Because the outwash sediments originated as glacial outwash, organic content is negligible, except in recent alluvial deposition such as in the vicinity of Pierson Creek and in Mirror Lake.

2.2.1 Site-Wide Groundwater Flow

Figure 2-1 is a site-wide potentiometric surface map from the *2024 Groundwater Monitoring Report* (AECOM, 2025a). Blue arrows display the interpreted direction of groundwater flow from the main manufacturing area toward the south/southeast to White Lake. The groundwater velocity is approximately 2 feet per day (feet/day). The vertical groundwater gradient in the eastern two-thirds of the site is slightly downward from the site towards White Lake. Near White Lake, which acts as a discharge point, the vertical gradient is upward (DuPont Corporate Remediation Group [CRG], 2006). Based on multiple measurements presented in past semiannual reports, the direction and velocity of flow are consistent.

West of the former manufacturing area and adjacent to Pierson Creek, groundwater flow is to the west-southwest due to the influence of the Pierson Creek valley. Because of its distance from the interceptor wells, groundwater flow in the vicinity of Pierson Creek follows its natural pattern, discharging to Pierson Creek. There are numerous shallow, spring-fed tributaries that discharge along the foot of the hillside at Pierson Creek, and an upward vertical hydraulic gradient exists in paired monitoring well clusters near the creek.

2.2.2 Groundwater Monitoring

Groundwater quality at the facility is monitored under the supervision of EGLE. Compliance monitoring wells were installed in the fourth quarter of 2009 and have been monitored since that time. The comparison criteria used to evaluate the final acute values (FAV) plume were provided by MDEQ in response to a DuPont request for a Mixing Zone Determination for groundwater containing site-related volatile organic compounds (VOCs) flowing towards White Lake. MDEQ granted the mixing zone determination by letter (August 3, 2007), along with groundwater to surface-water interface (GSI) criteria for site-related VOCs. Chemours submitted a re-authorization request for the Mixing Zone Determination in February 2025, which is under review by EGLE. The mixing zone only applies to the fringes of the impacted groundwater, and groundwater above the FAV is being captured by the pump-and-treat system. The system continues to meet its remedial objectives based on the ongoing monitoring.

2.2.3 Groundwater Pump-and-Treat System

The site groundwater extraction system consists of four interceptor wells that remove groundwater from the aquifer to provide containment of groundwater containing site-related constituents above FAVs. FAVs have been established as part of the site mixing zone determination and were provided in the MDEQ letter *Mixing Zone Implementation* dated August 22, 2012.

Extraction flow rates for the well system vary from approximately 600 to 700 gallons per minute (gpm) from four wells (IW-08-142, IW-09-140, IW-06-140, and IW-07-144) (AECOM, 2025a). Extracted groundwater is conveyed to the site's treatment system within the fenced portion of the property. The treatment system consists of an air stripper and vapor phase carbon system to collect the VOCs. A steam system is used to

regenerate the carbon. A condenser system and decanter tank are used to recover VOCs from the regeneration. Recovered VOCs are stored in the decanter tank for disposal. Treated groundwater is conveyed via pipeline to the site's National Pollutant Discharge Elimination System (NPDES)-permitted outfall in Lake Michigan.

As shown on Figure 2-1, there is a "modeled capture zone" that predicts the extent of groundwater within the site's pump-and-treat system. The edge of the capture zone is displayed on the figure with a purple dashed line. The capture zone is a result of the hydraulic influence from the extraction wells. The modeled extent of the capture zone has been used to set the boundaries of the mixing zone because groundwater within the capture zone is not predicted to discharge to White Lake. As depicted on the figure, the boundary of the estimated FAV plume is within the modeled capture zone, indicating that the system is successfully capturing the FAV plume.

2.3 Exposure Setting and Future Land Use

Since 1998, the only activities at the site have been related to the characterization of WMUs and AOCs, operation of the groundwater pump-and-treat system and the recovery of the Lime Pile by Lime Specialties Incorporated. The former manufacturing area, Pierson Creek Landfill, and the CaF₂ Basin are surrounded by 8-foot, chain-link perimeter fences. Surrounding the fenced areas, most of the remaining property is forested with roads for access to monitoring wells, the site production wells, and former landfills.

Planned future land use includes the following (see Figure 1-3):

- Restricted areas for possible redevelopment (industrial/manufacturing) on the former manufacturing area.
- Restricted areas for use in remediation (landfills, property used for the pump-and-treat system).
- Other portions of the site may be re-developed for unrestricted, recreational, or commercial land use.

Neighboring single-family residential homes are present surrounding the facility property; however, the majority of these homes are south of the property in developments along White Lake. To the northeast, the adjacent property is owned by OxyChem, which has undertaken prior remedial action work that included the construction of a lined, 10-acre landfill and the installation and ongoing operation of a groundwater pump-and-treat system. OxyChem has also recorded a restrictive covenant on areas containing the containment vault, impacted soils, and properties overlying the groundwater plume.³

As noted in the *Documentation of Environmental Indicators – Current Human Exposures under Control* (MDEQ 2013), groundwater is not used for drinking water on the Chemours Montague site and occurs at depths (greater than 15 feet below ground surface [bgs]) where direct contact during intrusive activities is unlikely to occur. Groundwater is also not used for drinking water downgradient of the site (between William Road on the west and Lake Shore Drive to the east) due to pump-and-treat

³ *Hazardous Waste Cleanup: Occidental Chemical Company Facility – Montague, Michigan*. Retrieved on October 18, 2018, from <https://www.epa.gov/hwcorrectiveactionsites/hazardous-waste-cleanup-occidental-chemical-company-facility-montague>.

activities currently in operation capturing former manufacturing area groundwater and the municipal water connections installed to area residents.

Three areas of the site are fenced: the former manufacturing area, the inactive CaF_2 Basin, and the northern portion of the Pierson Creek Landfill. Some fencing is also present on the Lime Pile, and steel swing gates are maintained on the entrances of two-track paths from public roads. Private property signs are also present. Heavy vegetation reduces trespasser access to the site. However, trespasser access is possible along the two-track paths on the site.

3.0 WMUs and AOCs

This section summarizes the investigation findings and identifies CMS considerations for each of the units to be evaluated in the CMS.

3.1 Initial Listing of WMUs/AOCs

In an August 11, 2006, letter, MDEQ identified 13 WMUs/AOCs subject to corrective action and further evaluation.

- Northeast Landfill
- North Landfill
- Bury Pit Landfill
- Pierson Creek Landfill
- Waste Neoprene Landfill
- Basin Sludge Storage Area
- Lime Pile
- Calcium Fluoride (CaF₂) Basin
- Former NPDES Surface Impoundments (also on list as Corrosive Hazardous Waste Tanks)
- Former Injection Well
- Railcar Un/Loading Areas (East and West)
- Former Hydrogen Chloride Storage Tanks
- Generator Accumulation Area for Solvents Condensed from Air Stripper

Two additional areas were included in the prioritization document due to their relationship to the MDEQ-identified WMUs/AOCs:

- Mirror Lake (associated with the Lime Pile)
- Pierson Creek (associated with the Pierson Creek Landfill)

The following three WMUs/AOCs were listed in the MDEQ letter with a notation that they were not subject to further corrective action:

- Former PCB Spill Area
- Former Flammable Hazardous Waste Storage Area
- Former Hazardous Waste Storage Area

3.2 WMUs/AOCs Identified for CMS

In the 2018 CMS WP and in the EGLE approval with comments letter (dated November 12, 2019), the following units were recommended for a CMS (the remaining units were recommended for no further action):

- Northeast Landfill
- North Landfill

- Bury Pit Landfill
- Pierson Creek Landfill
- Waste Neoprene Landfill
- Basin Sludge Storage Area
- Lime Pile
- Mirror Lake
- CaF₂ Basin
- NPDES Surface Impoundments and Corrosive Treatment
- West Railcar Un/Loading Area

Note that in the CMS WP, groundwater within the former manufacturing area was proposed to be evaluated on a plume-wide basis and not distinguish individual WMUs. Therefore, the groundwater plume from the former manufacturing area is considered to be a separate unit. The groundwater plume near Pierson Creek, however, will remain a part of the evaluation for the Pierson Creek Landfill because those constituents are clearly related to the Pierson Creek Landfill.

Finally, one additional WMU/AOC was identified as a result of a site visit by EGLE personnel on May 8, 2024. During the visit, EGLE observed an area of gravel and soil with a light green color within the former Neoprene plant area. Based on samples collected by EGLE, which indicated elevated metals (primarily copper) and the location's proximity to a former catalyst storage shed, the area was identified as the Copper Catalyst Release Area.

3.3 CMS Supplemental Investigations

To support corrective measure alternative evaluations, additional data collection activities were identified in the CMS WP and the corresponding approval letter from EGLE dated November 12, 2019. The CMS WP and the approval letter requested additional investigations in the Bury Pit Landfill, Mirror Lake, and the Lime Pile. The approval letter also requested an evaluation of groundwater for metals and an evaluation of vapor intrusion to indoor air pathway (VIAP). The final and most recent sampling program was to delineate the extent of constituents in soil in the Copper Catalyst Release Area (identified separately). The results of these supplemental programs are summarized in the unit-by-unit discussions below.

3.4 WMU/AOC Descriptions and Investigation Findings

This section provides descriptions of each unit that is evaluated in this CMS. These descriptions are drawn primarily from the 2018 CMS WP but have been updated as appropriate where additional recent information is available. Included with these descriptions are the results from the sampling of metals in groundwater and the VIAP evaluation.

3.4.1 Northeast Landfill

Unit Description

The Northeast Landfill operated from 1958 to 1965. This landfill, which received waste from the early acetylene and neoprene manufacturing processes, is located north of the

Former Manufacturing Area (see Figure 3-1). The landfill is approximately 1.2 acres and was constructed over native soils. Portions of the landfill have inert waste materials at the surface. The Northeast Landfill does not have a liner or leachate collection system.

Based on a photographic survey of the site and aerial photographs, the Northeast Landfill provides limited ecological habitat for terrestrial receptors. The landfill is a sparsely vegetated open field with some low lying grasses. North and west of the landfill is a forested area. To the east is Lamos Road and to the south is the former industrial area of the site.

RI Conclusions and Recommendations

Historical remedial investigation (RI) activities at the unit determined the nature and extent of the landfill materials and found that few constituents in the subsurface soil or waste material samples exceeded applicable MDEQ Part 201 screening criteria (MDEQ, 2013b) for non-residential land uses (commercial/industrial). The detected constituents were consistent with the landfilled materials. The data also indicated that there was a release of toluene to groundwater.

During the 2010/2011 RI, surface soil results indicated that no constituents of potential concern (COPCs) were present in the surface at concentrations exceeding applicable screening levels. None of the constituents detected exceeded applicable MDEQ Part 201 screening criteria for non-residential land uses (commercial/industrial). Few constituents exceeded ecological screening criteria; however, it was concluded that there is a low potential for adverse effects to terrestrial receptors.

Groundwater monitoring data indicated that the release of toluene to groundwater is limited to directly downgradient of the landfill (< 200 feet). Attenuation of toluene concentrations in groundwater downgradient of the area supports that degradation processes are occurring. In addition, groundwater passing under this landfill is within the capture zone of the pump-and-treat system. No further investigation of soil at the Northeast Landfill was recommended in the 2012 RI Report (URS, 2012).

3.4.2 North Landfill

Unit Description

The North Landfill operated from 1960 to 1965. This landfill, which received waste from the early acetylene and neoprene manufacturing processes, is located north of the Former Manufacturing Area (see Figure 3-2). This landfill is approximately 0.6 acres and was constructed over native soils. Portions of the landfill have inert waste materials at the surface. The North Landfill does not have a liner or leachate collection system.

Based on a photographic survey of the site and aerial photographs, the North Landfill provides limited ecological habitat for terrestrial receptors. The landfill is a sparsely vegetated open field with some low-lying grasses. The area surrounding the landfill is primarily forested.

RI Conclusions and Recommendations

Historical RI activities at the unit determined the nature and extent of the landfill materials and found that none of the constituents detected in the subsurface soil samples exceeded applicable MDEQ Part 201 screening criteria for non-residential land uses (commercial/industrial). Semi-annual groundwater monitoring data did not indicate a release to groundwater.

During the 2010/2011 RI, surface soil results indicated that no COPCs were present in surface soil at concentrations exceeding applicable screening levels. None of the constituents detected exceeded applicable MDEQ Part 201 screening criteria for non-residential land uses (commercial/industrial). Copper was the only constituent that exceeded ecological screening criteria; however, it was concluded that there is a low potential for adverse effects to terrestrial receptors. The landfill is sparsely vegetated providing limited ecological habitat.

No further investigation of the North Landfill was recommended in the 2012 RI Report.

3.4.3 Bury Pit Landfill

Unit Description

The Bury Pit Landfill operated from 1968 to 1985. This landfill is approximately 2.1 acres and was constructed over native soils northwest of the Former Manufacturing Area (see Figure 3-3). Portions of the landfill have inert waste materials at the surface. The Bury Pit Landfill does not have a liner or leachate collection system.

Based on a photographic survey of the site and aerial photographs, the Bury Pit Landfill provides limited ecological habitat for terrestrial receptors. The landfill is a sparsely vegetated open field with some low-lying grasses. The area surrounding the landfill is primarily forested.

RI Conclusions and Recommendations

Historical RI activities at the unit determined the nature and extent of the landfill materials and found that none of the constituents detected in the subsurface soil samples exceeded applicable MDEQ Part 201 screening criteria for non-residential land uses (commercial/industrial). Semi-annual groundwater monitoring data did not indicate a release to groundwater.

During the 2010/2011 RI, surface soil results indicated that no COPCs were present in the surface at concentrations exceeding applicable screening levels. None of the constituents detected exceeded applicable MDEQ Part 201 screening criteria for non-residential land uses (commercial/industrial). Copper was the only constituent that exceeded ecological screening criteria; however, it was concluded that there is a low potential for adverse effects to terrestrial receptors. The landfill is sparsely vegetated providing limited ecological habitat. No further ecological investigation of the Bury Pit Landfill was recommended.

MDEQ requested additional lithologic data be collected at the Bury Pit, and this was completed in 2013 and documented in the *Remedial Investigation Report - Addendum No. 3 Supplemental Investigation – Bury Pit Landfill* (URS, 2014a).

Open burning of trash and possibly waste solvents was reported to have occurred at the unit. Four site-specific furan congeners were analyzed in the 2010/2011 RI samples and the toxicity equivalence (TEQ) of 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD) was below screening criteria. However, based on the site history, additional analysis of the complete dioxin/furan analyte list (17 dioxin and furan congeners) in surface soil was recommended for this unit in the CMS WP.

Additional Investigation: Determine if Dioxins/Furans Are Present at Bury Pit Landfill

Chemours conducted soil sampling for dioxins and furans in the surface and subsurface soil of this unit. Samples were collected from six locations within the footprint of the Bury Pit Landfill in July 2020 and analyzed for 17 dioxins and furans. The calculated TEQ for the samples was compared to residential direct contact screening criteria. Several dioxins and furans were detected, but all TEQs were below the screening criteria (AECOM, 2020a). Based on these results, dioxins and furans are not considered in remedy selection for the Bury Pit Landfill.

Additional Investigation: Confirm the Footprint of the Bury Pit Landfill

Previous reviews of historical aerial photographs (specifically from 1968) had suggested that there was a path circling a small area north from the Bury Pit Landfill. To determine if this path was related to the landfill, a reconnaissance of the area was conducted in May 2018. Based on that walk-through inspection, the area in question appeared to have been a turnaround for vehicles (possibly for security patrols). A low pile of moss-covered, broken concrete cinder block fragments was found in the area (see photographs in Appendix A), and these fragments are believed to be from homes that pre-dated manufacturing activities. The ground was otherwise undisturbed indicating that this area was not used for industrial activity.

3.4.4 Basin Sludge Storage Area

Unit Description

The former Basin Sludge Area is located north of the Lime Pile (see Figure 3-4). This area was used during the early 1970s to contain various sludges and solid material generated from the neoprene operations. Waste material disposed in this area includes silicas, various salts, calcium carbonate, plastics, neoprene polymers, and other inert materials (DuPont, 1989).

A memorandum from the plant manager indicates that in 1976, this basin material was excavated and the excavation was backfilled (DuPont CRG, 2006).

RI Conclusions and Recommendations

During the 2010/2011 RI, subsurface soil samples were collected at the unit to verify that no residual COPCs were present at concentrations exceeding applicable screening levels. Additional soil borings were performed in 2013, and there was only one exceedance of non-residential criteria for chloride, which was not a site COPC. Consistent with the 2010/2011 RI findings, residual impact to underlying soil is not indicated. No further investigation of the former Basin Sludge Storage Area was recommended in the RI Report Addendum No. 1 (URS, 2014b).

3.4.5 Waste Neoprene Landfill

Unit Description

The former Waste Neoprene Landfill is located due north of the Lime Pile (see Figure 3-4). The former Waste Neoprene Landfill operated during the 1960s as a disposal unit for waste from site Neoprene operations. This landfill was unlined and measured approximately 75 by 50 feet. In 1976, the neoprene waste material was

removed, treated, and disposed of following appropriate regulations. The excavation was backfilled with lime and sand (DERS, 1997).

RI Conclusions and Recommendations

Historical sampling of native soil materials does not indicate that waste material remains. However, the analytical list utilized at the unit during the RI was limited and did not include constituents typically associated with neoprene (such as chlorinated butenes and copper). As a result, further investigation of this unit was recommended in the RI Report.

During 2013, additional soil boring samples were collected as recommended in the RI Report and based on feedback from MDEQ. With the exception of chloride, none of the other constituents detected exceeded applicable screening criteria for residential or non-residential land uses (commercial/industrial). The chloride exceedance was observed at depth (5 to 10.5 feet bgs). Chloride was not detected above screening criteria in any other sample location.

No further investigation of the former Waste Neoprene Landfill was recommended in the RI Report Addendum No. 1 (URS, 2014b).

3.4.6 Mirror Lake

Unit Description

Mirror Lake is a small body of water that is located due south of the Lime Pile (see Figure 3-5). Based on historical aerial photographs, it is estimated that this lake originally measured approximately 800 feet long by 300 feet at its widest point. The maximum water depth of this lake is estimated to be approximately 2 to 3 feet.

During the mid to late-1960s, lime from the Lime Pile was transported into Mirror Lake by erosion and overland flow. Based on aerial photographs, it is estimated that one third to one half of Mirror Lake has received lime material. Erosion is no longer active as the south impoundment berm was repaired in the 1960s. There has been no apparent change in the extent of the lime sediment over the last four decades based on appearance in the aerial photographs. Since the May 1968 air photograph, the southward extent of lime material has remained the same in subsequent photographs.

During the RI data evaluation, the historical stability of the Lime Pile and lime sediment in Mirror Lake were evaluated by a review of historical aerial photographs ranging from 1938 to present. The historical photographs included in the CMS WP (AECOM, 2018) show that Mirror Lake has varied considerably in extent and that part of the lake was partially filled in with sediment before the Lime Pile was built. Mirror Lake was at its greatest extent in the 1955 photograph. From the photographs, it is believed that the lake level of 1938 and 1950 was lower, exposing more of the flat bottom of Mirror Lake. Beginning with the 1962 photograph, the Lime Pile is visible, and lime sediment is visible in the northern one-third of Mirror Lake. In the 1968 photograph, the lime sediment appears to have reached its current extent. The southern extent of the lime sediment in Mirror Lake has not visibly changed since 1968, indicating that the lime sediment is stable. Mirror Lake, however, has continued to vary in size; most of the open water seen in the 1992 and 1998 photographs has disappeared in the 2005, 2006, 2009, and 2010 photographs. This variation in the extent of Mirror Lake is believed to be related to the water table elevation in the area, which is primarily controlled by the lake level in White Lake (and Lake Michigan) and precipitation.

RI Conclusions and Recommendations

During the 2010/2011 RI, a sample of Mirror Lake lime material was collected and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP) selenium. The purpose of the sampling was to determine the potential for lime-related selenium to negatively impact Mirror Lake. Based on the sampling conducted at the unit, selenium is not a COPC. In addition, the lime sediment now in Mirror Lake is stable with no apparent change in its lateral extent since the late 1960s. No further erosion of lime southward has occurred since that time.

The 2012 RI Report contained a recommendation to collect information about the thickness of the lime sediment. This information was collected (see below) and subsequently, Chemours has initiated the permitting, planning, and implementation of lime relocation from Mirror Lake to the Lime Pile, which is expected to be completed before the end of October 2025. Restoration of the wetland is being done by the Muskegon County Conservation District.

Additional Investigation: Assess Depth and Volume of Lime Sediment in Mirror Lake

In an inventory calculation of lime material was made in 2000 that estimated 2 feet of lime sediment to be present in the northern half of Mirror Lake. A hand auger performed in the lime in Mirror Lake also showed 2 feet of lime in 2011. Chemours then dug test pits in July 2024 to confirm potential excavation depths and volumes. The investigation confirmed an average of 2 feet of lime sediment across the 2.5-acre affected portion of Mirror Lake, or approximately 8,000 cubic yards. As noted above, the lime is currently being consolidated into the Lime Pile for drying and later re-use off-site.

Additional Investigation: Mirror Lake

In addition to measuring the depth of lime sediment in Mirror Lake, EGLE's CMS WP approval letter requested Chemours to measure pH and selenium concentration in the lake, to evaluate whether Mirror Lake qualifies as "waters of the state," and to consider potential ecological impacts.

Regarding selenium, this concern dates back to a single sample of lime collected in 1996, which had an estimated result of 0.930 milligrams per kilogram (mg/kg). Coincidentally, the sample for Mirror Lake collected at that time was tested and did not indicate impact by selenium and a subsequent sample in 2010 in the Mirror Lake lime did not contain selenium in either the TCLP or SPLP sample (see Section 4.8.2 of the *2010/2011 Remedial Investigation Report*, URS 2012).

The approved interim measure being implemented will restore the approximately 2.5 acres of Mirror Lake via on-site consolidation of the lime into the Lime Pile. As restoration proceeds, this will address potential ecological impacts. Dredging and on-site consolidation began in early September 2025. Following lime removal, the area will be restored to wetland habitat supporting a variety of native flora and fauna (Muskegon Conservation District, 2025). The water of Mirror Lake will also be monitored post-excavation for macro nutrients and water quality parameters to confirm the performance of the restoration.

Michigan's *Natural Resources and Environmental Protection Act* (Michigan State Legislature, 1994 et. seq.) defines "waters of the state" as "groundwaters, lakes, rivers, and streams and all other watercourses and waters, including the Great Lakes, within the jurisdiction of this state." Further, "surface waters of the state" are defined in

Michigan Administrative Code R. 323.1044 as the Great Lakes and their connecting waters, all inland lakes, rivers, streams, impoundments, open drains, wetlands, and other surface bodies of water within the confines of the state excluding drainage ways and ponds used solely for wastewater conveyance, treatment, or control. Based on these definitions, Mirror Lake qualifies as “waters of the state.”

3.4.7 Lime Pile

Unit Description

In approximately 1955, Union Carbide began manufacturing acetylene, which produced a lime by-product. The lime by-product was stored in a low-lying area located south of Wilkes Road, north of Mirror Lake. In the early 1960s, DuPont purchased Union Carbide’s acetylene plant and continued acetylene manufacturing until approximately 1972. Figure 3-6 displays the Lime Pile.

Historical leaching of the lime material had impacted the groundwater below and downgradient of the pile. Impact to groundwater from the Lime Pile included an increase in pH (range 11 to 12), and the presence of thiocyanate and sulfide. In the mid-1960s, to address lime-related groundwater conditions, DuPont installed a series of groundwater interceptor wells downgradient of the Lime Pile to collect, treat, and discharge impacted water. Chemours continues to operate this system and the interceptor wells successfully capture groundwater from the vicinity of the Lime Pile.

The Lime Pile was surveyed for volume in 2000. The entire complex of lime was estimated to be about 36 acres in extent and ranged in thickness from 5 feet to up to 53 feet. Not counting Mirror Lake and the CaF₂ Basin, the Lime Pile is estimated at 29.14 acres (Synagro, 2000). Lime Specialties, Inc., was formed by DuPont in early 1988 to mine and market the lime for re-use, and this activity continues.

Also during the 2000 investigation, samples of lime were collected from borings and the analytical results were below MDEQ regulatory criteria. In addition, a 2002 bioassay testing for acute toxicity found a 48-hour median effective concentration (EC50) of greater than 120 milligrams per liter (mg/L) of lime (highest dose tested).

RI Conclusions and Recommendations

Based on the past lime sampling, there is not a current exposure to unacceptable concentrations of site-related constituents. Groundwater impacts (alkalinity, sulfide and thiocyanate) from the Lime Pile are contained by the pump-and-treat system. The Lime Pile does however present an aesthetic issue.

Additional Investigation: Lime Pile

In the CMS WP approval letter, EGLE commented that leachate or groundwater associated with the Lime Pile may contain elevated Radon (Rn) or Radium (Ra) decay. It was suggested that Rn or Ra might be present if Ra was associated with calcium (Ca) in sedimentary formations that were used as the source of calcium carbonate (CaCO₃) to produce the calcium carbide, which was then converted to hydrated lime.

AECOM responded to this comment in an email dated March 18, 2020 (AECOM, 2020b). Because Ra and Rn have very short half-lives, they can only be sustained in a rock formation that contains specific isotopes of uranium and/or thorium. Neither of these elements is likely to have been present in significant amounts in the calcium carbide that was used at the facility to manufacture acetylene.

3.4.8 Calcium Fluoride (CaF₂) Basin

Unit Description

The CaF₂ Basin consists of wastewater treatment residual solids that have been placed in a basin that is situated on top of a layer of lime material. The lime bed acted as a final neutralization step for any residual fluoride associated with the basin material.

The basin operated in the 1980s and is no longer in use. It is estimated that the basin ceased operations prior to 1990. This unit is approximately 5 acres (Eikon Planning and Design, 2000), is underlain by a 10-foot-thick lime bed (DuPont, 1989), and is surrounded by a chain-link fence. Figure 3-6 displays the basin location.

Based on a photographic survey of the site and aerial photographs, the CaF₂ Basin provides limited ecological habitat for terrestrial receptors. The basin is a bare area with very little vegetation. To the east and south of the basin is the Lime Pile. To the north of the basin is the former industrial area of the site and to the west of the basin is a forested area.

RI Conclusions and Recommendations

Historical RI activities at the unit characterized basin materials and identified the highest arsenic concentrations measured in surface soil at the site (2,020 mg/kg). However, there is a low potential for exposure under current conditions. The 8-foot fence around the basin prohibits access for both trespassers and large terrestrial wildlife such as deer. Elevated concentrations of antimony, arsenic, and fluorine were detected in surface soils indicating that there is a potential for ecological risk to terrestrial receptors that can access the area; however, the limited ecological habitat present in the basin will lower the exposure potential.

During the 2010/2011 RI, groundwater samples were collected at the CaF₂ Basin. A release of fluoride and other constituents to groundwater is not indicated.

No further investigation of the CaF₂ Basin was recommended in the 2012 RI Report.

3.4.9 Pierson Creek Landfill

Unit Description

The Pierson Creek Landfill operated from 1965 to 1972. This landfill, which received liquid and solid wastewater treatment residues from CFC and neoprene manufacturing, is approximately 2 acres. The landfill was constructed over native soils and does not have a liner or leachate collection system.

Pierson Creek Landfill is located west of the Former Manufacturing Area in a remote portion of the site (see Figure 3-7). The landfill has an 8-foot chain-link fence around the perimeter to restrict access to trespassers and large terrestrial receptors. The landfill is a thickly wooded area. The thick vegetation in the area provides ecological habitat for terrestrial receptors such as birds, mammals, and soil invertebrates.

RI Conclusions and Recommendations

Historical RI activities at the unit determined the nature and extent of the landfill materials and identified several organic and inorganic constituents in subsurface soil and subsurface waste material samples above applicable MDEQ Part 201 drinking water protection and direct contact screening criteria for non-residential land uses

(commercial/industrial). A release to underlying groundwater was also confirmed at the unit.

During the 2010/2011 RI, surface soil results indicated that similar to the historical data, organic and inorganic constituents were detected in the surface soil samples above applicable MDEQ Part 201 drinking water protection and direct contact screening criteria for non-residential land uses (commercial/industrial). Most exceedances were observed in location 10PCLSS-06, which was collected from a black silty clay, assumed to be waste material from the former surface impoundments. The potential for exposure to these constituents in the surface waste material (collected from a depth of 0 to 0.5 feet bgs) and in the subsurface is minimized by the surrounding fence.

The landfill is thickly vegetated providing ecological habitat for terrestrial receptors; however, the perimeter fence noted above limits the exposure to larger terrestrial wildlife. Based on the ecological screening, there is a generally low potential for ecological exposure to terrestrial receptors at the locations that were sampled during the 2010/2011 RI with the exception of location 10PCLSS-06; however, the extent of contamination in surface soil is not fully defined. As a result, there is some uncertainty with determining potential ecological exposure to terrestrial receptors from surface soils; therefore, additional investigation of this area is recommended to be conducted as part of CMS planning activities to fully define surface soil contamination and complete the ecological exposure evaluation for the Pierson Creek Landfill.

Current groundwater monitoring data indicate that the extent of the release in groundwater is limited to directly adjacent to the landfill in the upper aquifer. A potentially complete groundwater discharge pathway from the landfill to Pierson Creek is evident. However, an adverse impact to surface water and sediment in Pierson Creek is not apparent. Considerable additional investigation of the groundwater discharge pathway was performed consisting of a tree core sampling, seep sampling, shallow groundwater sampling near suspected discharge areas, and installation of cone-penetrometer testing borings (CPTs) and new wells west of Pierson Creek. Data collected confirmed that a shallow plume of VOCs (tetrachloroethylene [PCE]) are discharging to Pierson Creek in a narrow area on the eastern side of the Pierson Creek valley. VOC extent was limited to the groundwater discharge points and small tributaries and did not extend into Pierson Creek itself.

Based on the findings summarized in the *Remedial Investigation Report Addendum No. 2 – Pierson Creek Landfill Area*, no further investigation is warranted (URS, 2014c).

3.4.10 Pierson Creek

Pierson Creek is not a WMU but is located approximately 250 feet west of Pierson Creek Landfill (see Figure 3-7). The NPDES permitted wastewater discharge line travels through this western segment of Chemours property. Treated water running through the NPDES wastewater line crosses over Pierson Creek on its way to being discharged into Lake Michigan.

Physically, Pierson Creek is a small perennial stream fed by numerous spring-fed tributaries. At the northern site boundary, the creek drains a rural, agricultural area extending approximately 5 miles north of the site. South of the site, the creek flows southwest and empties into Sadony Bayou approximately 0.5 miles downstream. The Creek ultimately drains into White Lake approximately 1 mile south of the site near the White Lake outlet to Lake Michigan.

Within the site property boundary, there are approximately five small tributaries that flow into the main channel of Pierson Creek. The width of the main channel ranged from approximately 3 to 12 feet, with a typical width of 8 feet. Water depth in the main channel ranged from about 4 to 8 inches and sediments are predominately composed of sand. The width of the tributaries ranged from 1 to 4 feet, with a typical width between 1 and 2 feet. Depth of water in the tributaries ranged from 1 to 6 inches, and sediments vary from sand to silty muck. Within the creek and tributaries, there is little to no submerged or emergent aquatic vegetation; however, the banks of the creek and tributaries are thickly vegetated with overhanging trees and herbaceous vegetation that shade the water.

3.4.11 Groundwater Plume from Former Manufacturing Area

Groundwater has been sampled for site-related constituents during historical investigations and on a routine basis since the 1990s. This data set was used to determine the horizontal and vertical extent of the groundwater plume that was released from within the former manufacturing area. Although the Lime Pile had historically contributed to groundwater impacts, the VOCs related to the Neoprene and Freon Manufacturing areas have been the focus of the investigations and monitoring.

As noted in Section 3.2, it is intended that this CMS evaluate groundwater near the former manufacturing area on a plume-wide basis and not attempt to distinguish individual WMUs or source areas of the plume.

Figure 3-8 displays a general map of the groundwater plume where concentrations are now interpreted to exceed the mixing zone FAV based on results in the *2024 Groundwater Monitoring Report* (AECOM, 2025a). Although additional VOCs have historically been detected in groundwater, only PCE, trichloroethylene (TCE), cis 1,2-dichloroethylene, carbon tetrachloride, and benzene now exceed Part 201/Part 213 risk-based screening levels (RBSLs).

Groundwater from the plume area is not used on-site for drinking water purposes, and residential users downgradient of the site are on water provided by the City of Montague. Deed restrictions in areas near the plume would prohibit the use of groundwater as drinking water in the future. Furthermore, White Lake is not used for water-supply purposes near the site. Therefore, potential exposure via direct contact (ingestion or dermal contact) with groundwater for on-site industrial workers and off-site residents/workers is low.

3.4.12 NPDES Impoundments and Corrosive Treatment

Unit Description

The Former NPDES Surface Impoundment consisted of a series of settling basins that were used to treat wastewater associated with the Freon manufacturing activities. The location of the former impoundments is shown in Figure 3-9. The wastewater was transported to the NPDES impoundments by a concrete and wood-lined ditch system. This unit operated from the early 1960s until 1996 when facility operations were shut down. The ditch system is also located within the Former Manufacturing Area.

In 1972, a 4-foot by 6-foot hole was found in the concrete bottom of the central basin. This hole was repaired, and groundwater was pumped until it was determined that the impact was limited in extent (DuPont letter to the MDEQ dated August 19, 1996).

RI Conclusions and Recommendations

During the 2010/2011 RI, subsurface soil samples were collected from six locations to determine if the ditch system has impacted the adjacent soil. Integrity of the ditch system appears intact, and a release to the adjacent soil is not indicated. No site-specific constituents were detected in the soil samples collected.

Groundwater samples were collected from three downgradient monitoring well locations to determine whether the former impoundments are a source of constituents to groundwater. Groundwater data collected from two rounds of sampling indicate the presence of one constituent (PCE) in groundwater slightly above screening criteria.

During the third and fourth semi-annual groundwater monitoring events downgradient of the former surface impoundment in 2012, there were no detections of site-related constituents, and sampling was discontinued. Further sampling of groundwater near the Former NPDES Impoundment/Wastewater Ditch was considered not needed.

Unit Status

Results of the soil sampling near the ditch and two years (2011-2012) of semiannual groundwater sampling near the former surface impoundment indicated no residual impact by this unit. This unit was not recommended for CMS in the CMS WP; however, sampling associated with the VIAP evaluation (see Section 3.4.15) was performed including soil borings in the footprint of the former ponds.

3.4.13 West Railcar Un/Loading Area

Unit Description

The West Railcar Un/Loading Area, was known as the feed stock unloading area during site operation. The area is in the south portion of the Freon[®] manufacturing area (see Figure 3-10). The West Railcar Un/Loading Area measures approximately 100 feet in length east to west between a former warehouse and First Street. Raw products unloaded in this area included hydrofluoric acid, PCE, and carbon tetrachloride. Freon[®] products were loaded in rail cars and tanker trucks in this area. By-product hydrochloric acid from the Freon[®] manufacturing process was also stored in tanks and loaded in this area (DuPont CRG, 2006).

Groundwater contamination in this area was first detected in the late 1960s. Large metal drip pans were installed beneath each un/loading spot to limit the potential for future releases.

RI Conclusions and Recommendations

Soil samples collected during 1996 from five soil borings contained VOCs, but these results were below Part 201 direct contact and drinking water protection criteria. Additional samples collected during the RI and analyzed for pH did not indicate impacts from HCl. Based on the historical handling of VOCs, this unit is evaluated in conjunction with the Groundwater Plume from the Former Manufacturing Area.

3.4.14 Copper Catalyst Release Area

Unit Description

The Copper Catalyst area was identified during a site visit on May 8, 2024, EGLE personnel observed an area of gravel and soil with a light green color within the former Neoprene plant area (see Figure 3-11). EGLE personnel collected samples of the

material for analysis for metals, total cyanide, and semi-volatile organic compounds (SVOCs). The analytical samples showed the material to be consistent with spent copper catalyst as metals (predominantly copper) were detected. Total cyanide and SVOCs were non-detect in the samples.

Based on this finding, EGLE identified this area as the “Copper Catalyst Release” area and requested that Chemours characterize the nature and extent of the material. Delineation sampling performed in August 2024 identified a small area (approximately 175 square feet) of shallow soil where copper exceeds the non-residential direct contact criterion.

Delineation of the Copper Catalyst Release Area

On August 21, 2024, AECOM performed shallow soil borings along two transects in the vicinity of the former Catalyst Storage Area. Grab samples of soil were collected at two depths in each boring to characterize the highest concentration and vertically delineate by collecting the second sample at a depth below visually apparent material. Samples were analyzed for metals, VOCs, and SVOCs.

Appendix B contains the following information from that field effort:

- Table B-1 lists the details of each sample collected in the August 2024 event.
- Table B-2 presents the results for metals analysis.
- Table B-3 presents the VOC results.
- Table B-4 presents the SVOC results.
- Figure B-1 displays the locations and the results for copper (the only constituent to exceed the direct contact criteria for non-residential use). The delineated extent of the exceedance is plotted on this figure.
- The analytical laboratory report is included.

Based on the data collected, a small area of shallow soil (noted on Figure B-1) contains copper exceeding the non-residential direct contact criteria. This exceedance is limited to a depth of 4 feet (the sample below the exceedance was collected from a depth of 4 feet).

3.4.15 Additional Investigation: Evaluate VIAP (site-wide)

As requested by EGLE in the CMS WP approval letter (EGLE, 2019), the VIAP was evaluated in 2024 for existing structures and potential future construction on-site and for off-site homes and other structures located above the groundwater plume.

Previous indoor air evaluations conducted during RI at the site used methods that have been superseded by new VIAP guidance from EGLE. Under the new guidance, Chemours provided EGLE with a list of detections at the facility in soil or groundwater, a generalized depth-to-groundwater, and information about soil at the site. EGLE used these inputs to develop four tables listing the site-specific volatilization to indoor air criterion (SSVIAC) for each constituent by medium, and Chemours conducted an initial screening of existing data based on the calculated SSVIACs. Analytical results for some VOCs exceeded the criteria, prompting additional investigation.

From August to October 2024, Chemours collected soil, groundwater, and soil gas samples to achieve the following objectives:

- Collect data needed to define the extent of the property over which volatile constituents are present above residential SSVIAC in soil and groundwater.
- Determine if a release had occurred from four waste management units near the former Waste Settling Ponds.
- Determine if soil gas contained volatile constituents in site groundwater near the property boundary.

Following data collection and evaluation, Chemours submitted the *Supplemental VIAP Investigation Report* (AECOM, 2025b) with the following conclusions:

- There is clear delineation of most chlorinated VOCs (TCE, carbon tetrachloride, and chloroform) in soil and in groundwater. Two soil samples in one location exceeded SSVIAC for PCE near Pierson Creek Landfill, but the concentrations were only slightly above SSVIAC, indicating that the limit of the exceedance area is close. These SSVIAC exceedance areas are shown on Figure 3-12.
- Other VOCs that exceed soil SSVIAC (acetaldehyde, benzene, and methylene chloride) are not as clear because detections in the blank samples indicate other contributing sources. For benzene (and other BTEX), the concentrations at the outer samples are close to the residential soil SSVIAC, and there were no detections of benzene in the supplemental groundwater samples. Acetaldehyde was very widely detected in soil but only detected in two wells in groundwater. Soil gas sampling results were similar across the locations and in both ambient blank samples, supporting the evidence that this constituent is present due to ambient conditions.
- Two exceedance areas of soil gas were found: one near the former Railcar Un/Loading Area (carbon tetrachloride) and the other on the immediate downgradient (western) side of Pierson Creek Landfill (TCE). Both of these locations are consistent with site conditions.
- Groundwater and soil gas did not indicate constituents above SSVIAC near any residences.
- Exceedances of SSVIAC are limited to the area controlled by the existing groundwater pump-and-treat system and around the Bury Pit Landfill and Pierson Creek Landfill.

Three additional soil gas sampling events were conducted during the first, second, and third quarters of 2025. The most recent results were collected in August 2025, and results from the soil gas sampling are being issued separately. These soil gas data are consistent with the results from the initial event and support the conclusions from the *Supplemental VIAP Investigation Report*. Based on this investigation, there is not a complete off-site VIAP pathway of site-related VOCs, and the on-site VIAP pathway can be addressed via institutional and engineering controls (I&ECs).

3.4.16 Additional Investigation: Additional Sampling for Metals in Groundwater

In a letter dated November 12, 2019, EGLE requested that Chemours sample for the Michigan 10 Metals list (arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc) and basic geochemical parameters to evaluate if any metals are present that would materially change the corrective measures study conclusions.

Chemours conducted sampling for the Michigan 10 Metals plus antimony, cobalt, and nickel and basic geochemical parameters (bicarbonate, bromide, calcium, carbonate, chloride, fluoride, iron, magnesium, manganese, potassium, silicon, sodium, sulfate, turbidity, redox potential [Eh], and pH) coincident with the first and second half 2021 annual and semi-annual sampling events.

Based on the analytical results from the two sampling events, Chemours concluded that aside from a small number of wells that had exceedances of iron, manganese, and zinc in unfiltered samples, all wells that contained exceedances of EGLE tap water criteria are within the capture zone of the interceptor well system (AECOM, 2022). Based on these results, metals will be considered in the remedy selection for Pierson Creek Landfill, North Landfill, Northeast Landfill, and Bury Pit Landfill.

Within the Groundwater Plume, samples collected from IW-09 represent the concentration of metals entering the groundwater treatment system (GWTS). The analytical results from the two monitoring events showed only one exceedance (manganese) slightly above the secondary drinking water standard. Because the GWTS does not include metals treatment, the groundwater monitoring program will be evaluated during the CMS, and select metals may be added to the analyte list for water from the interceptor wells.

4.0 CMS Approach

Consistent with the Resource Conservation and Recovery Act (RCRA) permit and EPA's *Fact Sheet #3, Final Remedy Selection for Results-Based RCRA Corrective Action* (EPA, 2000), a focused CMS was conducted to streamline the remedy selection process. Specifically, the corrective measure technologies identified in this report are based on site-specific conditions, including the extent, nature, and complexity of unit releases. The technologies identified are considered appropriate and implementable technologies that are consistent with expected future land uses.

This evaluation includes the three core elements of a CMS. First, impacted media are delineated, and pathways and potentially unacceptable exposures are identified. This forms the basis of the CAOs and MCSs. Second, technologies are identified, screened, and evaluated for their ability to mitigate any potentially unacceptable exposure. Finally, the technology (or combination of technologies) that meets the CAOs and best fits the selection criteria considering the future use is chosen.

4.1 Corrective Action Objectives

The overall corrective action goal for the Montague site is protection of human health and the environment. As documented in the *Documentation of Environmental Indicators – Current Human Exposures under Control CA725* (MDEQ, 2013), the potential for exposures to impacted media (surface soil, subsurface soil, sediment, groundwater, and surface water) is not considered significant under current conditions.

Current land use at the site consists of former manufacturing areas, former landfills, and surrounding buffer land (see Figure 1-3). It is anticipated that future land use in the former manufacturing area and landfill areas will remain non-residential (industrial or commercial land use). Future land use in the surrounding buffer land may include re-development for residential, recreational, or commercial land use. Deed restrictions prohibiting the use of groundwater as drinking water would be necessary in a portion of the buffer land.

As shown on Figure 1-3, the WMUs evaluated in the CMS are located within portions of the site designated for non-residential land use. No corrective action units were identified in the surrounding buffer land.

At present, the site engineering control measures (such as fencing, existing cover systems, appropriate health and safety management plans for on-going site activities, and the on-going groundwater pump-and-treat system) are providing overall protection of human health and the environment at the site. Based on these considerations, the corrective measures that are ultimately selected should address the following CAOs:

- CAO 1: Establish and implement appropriate institutional controls in addition to the existing control in place to ensure future land-use practices are protective of future land users and also prevent consumption of groundwater containing site-related constituents as drinking water.
- CAO 2: Continue to provide long-term protection of people and the environment by controlling exposure to hazardous constituents in and associated with waste materials at the units identified in Section 3.4.
- CAO 3: Continue to control or eliminate the potential sources of releases to groundwater from the units identified in Section 3.4.

- CAO 4: Continue to control or eliminate lime-related materials present in the Basin Sludge Storage Area, Waste Neoprene Landfill, Lime Pile, Mirror Lake, and CaF₂ Basin.
- CAO 5: Continue site-wide groundwater monitoring to confirm effectiveness of the existing pump-and-treat system. This system is preventing site-related constituents from adversely affecting potential receptors.

4.2 Media Cleanup Standards

To evaluate corrective measure alternatives and whether the CAOs are met, MCSs were developed for groundwater, soil, surface water, and sediment. Consistent with EPA guidance, MCSs should be clear and reasonable, be protective of human health and the environment, and take into consideration site-specific conditions and foreseeable future land use. This section presents the technical approach used to develop the MCSs.

4.2.1 Groundwater

Groundwater MCSs for this site are EGLE Table 1 Part 201/213 Generic and Risk-Based Screening Levels for residential use (EGLE drinking water criteria) for site-related VOCs in the current groundwater monitoring program and metals of interest detected during the supplemental sampling conducted. Table 5-1 summarizes the selected groundwater MCSs.

4.2.2 Soil

Soil MCSs for this site are EGLE Table 2 Part 201/213 Generic and Risk-Based Screening Levels for direct contact (for Human Health) and residential drinking water protection criteria (for groundwater protection) for site-related VOCs in the current groundwater monitoring program and metals of interest detected during the supplemental sampling conducted. Table 5-2 summarizes the selected soil MCSs.

4.2.3 Soil Vapor

Soil vapor MCSs are SSVIAC developed by EGLE and documented in an interoffice communication from Senior Toxicologist Shane Morrison to Environmental Engineering Specialist Ronda Blayer on July 31, 2020. MCSs used in this CMS are from Table 1 of the interoffice communication (Nonresidential Volatilization to Indoor Air Criteria). Constituents are those detected in soil gas samples collected for the *Supplemental VIAP Investigation Report* (AECOM, 2025b) and subsequent soil gas sampling events. Table 5-3 summarizes the selected soil vapor MCSs.

4.2.4 Surface Water

As noted in Section 3.4.11, MDEQ granted a mixing zone determination with GSI criteria for site-related VOCs in 2007 for areas where the groundwater plume capture zone vents to White Lake. Chemours submitted a re-authorization request for the mixing zone determination in February 2025. Chemours plans to request a mixing zone determination for Pierson Creek, which also discharges to White Lake, during Corrective Measures Implementation (CMI). Consistent with the existing mixing zone determination, MCSs for surface water are chronic mass-loading criteria issued by EGLE for carbon tetrachloride, PCE, and 1,1,2-trichlorotrifluoroethane and EGLE's Generic Groundwater Surface Water Interface Criteria for other site-related constituents. Table 5-4 summarizes MCSs for

site-related VOCs and metals of interest detected during the supplemental sampling conducted.

4.3 Technology Screening and Evaluation of Corrective Measure Alternatives

Consistent with RCRA guidance, several technologies were identified, screened, and evaluated against the following threshold criteria:

- Protect human health and the environment.
- Control sources.
- Meet CAOs and MCSs.
- Comply with applicable standards for management of wastes.

The technologies meeting the threshold criteria were then developed into unit-specific corrective measure alternatives and evaluated further considering several decision factors (balancing criteria) consistent with EPA RCRA guidance documents. The balancing criteria considered in this CMS are as follows:

- Long-term reliability and effectiveness
- Reduction in the toxicity, mobility, or volume of wastes
- Short-term effectiveness
- Implementability
- Cost
- State and community acceptance

The ability of the corrective measure alternatives to meet the threshold criteria and balancing criteria was assessed qualitatively. For each unit evaluated, the corrective measure alternative that best met the balancing criteria was selected as the corrective measure alternative.

A systematic approach was used to screen and evaluate potential technologies and alternatives for each unit in accordance with EPA guidance. The approach focused on evaluating and selecting realistic remedies that considered the extent, nature, and complexity of the releases, impacts on the environment, and site topography and geology. The basic steps in this approach were described in the CMS WP and are as follows:

- Identify and screen corrective measure technologies that meet the threshold criteria.
- Identify potential additional investigation needs to evaluate potential technologies at each unit.
- Collect and evaluate supplemental data to determine feasibility of technologies.
- Develop and evaluate corrective measure alternatives.
- Propose the final remedies.

These steps are described in the following paragraphs.

As specified in EPA guidance, the identification and screening of technologies considered the media and waste characteristics, nature and extent of releases, and technology limitations. The results of the screening process are summarized in Section 6.2. Technology limitations were evaluated based on performance relative to the CAOs and potential construction limitations.

Prior to developing and evaluating unit-specific alternatives, additional investigation needs were identified for certain units as described in Section 3.4. These supplemental data were collected and used to evaluate the feasibility of technologies. The data collection and analysis activities are described in Section 3.4.

Based on the results of the technology screening process and the data collection and analysis activities, the unit-specific alternatives were developed and evaluated against the balancing criteria. The proposed remedy for each unit was then determined based on the alternative that best met the applicable criteria. The alternatives development and evaluation and remedy selection are presented in Section 6.2.

5.0 Development of Corrective Measure Alternatives

The CMS WP provided a summary of the investigation findings and identified potential corrective measure technologies for each of the units to be evaluated in the CMS.

This section describes the potential general categories of corrective measure technologies and presents unit-specific technology screening.

Potential general categories of corrective measure technologies were evaluated based on EPA's threshold criteria as follows:

- Protect human health and the environment.
- Control sources.
- Meet CAOs and MCSs.
- Comply with applicable standards for management of wastes.

The results of the threshold technology screening are provided in Table 3-1. Technology screening considered site and media characteristics, waste characteristics, and technology limitations.

The technologies that passed threshold screening were further evaluated based on conditions at each WMU. The list of WMU-specific proposed technologies is provided in Table 1-1.

The technologies presented in this section were selected based on the constituents and media of concern identified in the RI for each unit. Media of concern were based on potentially complete human health exposure pathways, including those based on current as well as reasonably anticipated future land uses, and ecological risks to be addressed.

To achieve the CAOs defined in Section 4.1, the following general technology categories were screened for each WMU:

- I&ECs
- Groundwater monitoring and monitored natural attenuation (MNA)
- Groundwater containment via extraction well system
- Capping
- On-site treatment
- Off-site disposal
- Off-site re-use
- On-site consolidation

The following subsections describe these technology categories and how they may be incorporated to mitigate risks at the site WMUs.

5.1 Technology Categories

5.1.1 I&ECs

I&ECs involve restricting/limiting public exposure to the WMUs via site access controls and land-use controls. Site access controls include physical restrictions (i.e., perimeter fencing with designated entrance access) and administrative controls (i.e., caution signs

with site contact info, health and safety plan, and materials management plan). Land-use controls use traditional real estate law to document environmental covenants and limit future development of the land. Land-use controls would be executed through a restrictive covenant recorded with the property deeds.

5.1.2 Groundwater Monitoring and MNA

Groundwater monitoring involves monitoring the water level and chemical constituents in groundwater wells. This monitoring would involve scheduled sampling/testing of upgradient and downgradient monitoring wells around selected WMUs for evaluation of potential groundwater impacts. This approach would also require a mixing zone determination be requested if the plume is discharging to surface water or migrating.

Analytical parameters will be tested for suspected site-related constituents and corresponding breakdown products. If groundwater data indicate that significant biotic or abiotic natural attenuation is taking place, MNA may be considered as a corrective measure. This approach will require a mixing zone for impacted groundwater that is discharging to surface water. For the CMS, this approach is considered for the groundwater near Pierson Creek Landfill and the plume that extends toward White Lake.

5.1.3 Groundwater Containment and Treatment (Pump-and-Treat)

Groundwater containment consists of maintaining hydraulic control via active (extraction wells) or passive (slurry walls, sheet pile barriers) means. The Montague site has an existing system of four extraction wells that are successfully maintaining capture of the plume that extends toward White Lake. In addition, there is a treatment system to remove VOCs from the water prior to discharge to Lake Michigan. For the CMS, pump-and-treat was considered for units within the current containment area.

5.1.4 Capping

Capping involves placing a physical barrier (soil, geosynthetic material, or both) over the constituents exceeding criteria. Capping can be an effective corrective measure for large areas or contaminated soil consolidation areas to cover and eliminate direct exposure pathways and reduce infiltration. Monitoring and maintenance are performed to assess that the cover prevents contact with waste and constituents in soil. Institutional controls are also needed to prevent future disturbance of the capped area. For this CMS, capping was evaluated for the units where waste remains in place (landfills) in the following formats:

- Surface waste removal and soil grading is an alternative for units where inert material remains in surface soils only and either COPCs have not been identified above screening criteria in related soils or groundwater or groundwater is captured by the existing pump-and-treat system. Soil grading would consist of minimal topsoil addition (3 to 6 inches) and grading to the surrounding contours.
- Surface cover improvement is an alternative for units with COPCs above direct contact criteria, but exposure is controlled by fencing and where migration to groundwater has not been confirmed. Surface cover improvement will consist of minimal topsoil addition (3 to 6 inches), grading to the surrounding contours, and a leachability evaluation of potential constituent mobility.
- Soil cap is an alternative for units with COPCs above screening criteria in soil but where migration to groundwater has not been identified in the past and/or is

unlikely to occur in the future, or where exceedances are limited to secondary maximum contaminant levels⁴ (MCLs) only. The purpose of the soil cap is to prevent direct contact with waste.

- Geotextile cap is an alternative for units where COPCs may migrate to groundwater or have previously been identified in groundwater above screening criteria and the unit is not within the groundwater plume capture zone.

5.1.5 On-Site Treatment

For this site, on-site treatment would be limited to areas impacted by arsenic. Prior to implementing treatment technologies, bench-scale studies would be conducted to define treatment specific parameters (quantity, quality, duration, etc.) and proper selection of biological compounds that would degrade or react with the site-related constituents. If the bioremediation approach generates wastes, then additional corrective measures technologies (i.e., capping or off-site disposal) may be implemented along with the treatment technology. For this CMS, on-site treatment was considered for the CaF₂ Basin; however, arsenic is already stabilized on a bed of by-product lime. Therefore, further on-site treatment is not needed.

5.1.6 Off-Site Disposal

Off-site disposal involves excavation and removal of soil and/or waste materials from the site. The soil and/or wastes are then transported to an approved disposal facility. This technology requires delineation sampling, waste characterization, waste profile approval, excavation, confirmatory sampling, and off-site transport and disposal in accordance with local and federal regulations. Off-site disposal is effective in areas with shallow soil contamination (like spills) where the limits have been accurately delineated and the depth of excavation would be limited. For this CMS, off-site disposal was considered for the landfills, the CaF₂ Basin, and the Copper Catalyst Release Area.

5.1.7 Off-Site Re-Use of Solid Materials

Off-site re-use of solid materials includes excavation and removal of select materials from the site for beneficial use (such as daily landfill cover or re-use as a fuel or raw material). Beneficial use materials must perform well in the new application and must be at least as safe for human health and the environment as the material they replace. This technology requires delineation sampling, material characterization, excavation, and off-site transport in accordance with local and federal regulations. For this CMS, off-site re-use was evaluated for areas with lime by-product deposits and without history of COPC detections above screening criteria within those deposits. If re-use is the selected technology, the underlying material will be characterized after the lime by-product has been removed to the extent possible, and further corrective measures will be applied if necessary.

5.1.8 On-Site Consolidation

On-site consolidation was evaluated to reduce the footprint of constituents exceeding criteria at the site and prevent direct contact. On-site consolidation of impacted soil or

⁴ Secondary MCLs are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These constituents are not considered to present a risk to human health at the secondary MCL.

wastes within an integrated disposal area would be protective by removing site-related constituents from several WMUs and providing a cap to eliminate direct contact exposure and reducing infiltration. This approach is most useful in WMUs with limited depths of excavation. For this CMS, on-site consolidation was evaluated for the units that have waste remaining in place.

5.2 Corrective Measures Alternatives to be Screened for WMUs/AOCs

This section summarizes specific considerations for each site unit and presents a listing of potential corrective measures alternatives that meet the threshold criteria and have the potential to meet CAOs and MCSs based on unit, media, and waste characteristics.

5.2.1 Northeast Landfill

The Northeast Landfill is shown in Figure 3-1. The medium of concern for the Northeast Landfill is the waste materials present in the soil and on the surface of this landfill. The areal extent of the Northeast Landfill in the CMS is approximately 1.2 acres with a waste thickness varying from 5 to 20 feet. There has been a release of toluene to groundwater, but the groundwater in this area is within the containment of the pump-and-treat system. Exceedances of tap water screening criteria for iron and zinc have been detected in wells upgradient and downgradient of this unit. COPCs in surface soil are below EGLE Part 201 non-residential screening criteria.

Potential corrective measures technologies evaluated in this CMS to address potential human health exposure pathways include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Uniform Environmental Covenant Agreement [Restrictive Covenant])
- Dig and haul either off-site or to a consolidated on-site unit
- Surface waste removal and soil grading
- Groundwater monitoring

5.2.2 North Landfill

The North Landfill is shown in Figure 3-2. The medium of concern for this WMU is the waste materials present in the soil and on the surface of this landfill. The areal extent of the North Landfill in the CMS is approximately 1.4 acres with a waste thickness varying from 3 to 10 feet. COPCs in surface soil are below EGLE Part 201 non-residential screening criteria. Exceedances of tap water screening criteria for iron have been detected in wells downgradient of this unit. Iron has not previously been identified as a site-related constituent and is subject to a secondary MCL. Secondary MCLs are established as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These constituents are not considered to present a risk to human health at the secondary MCL.

Potential corrective measures technologies evaluated in this CMS to address potential human health exposure pathways include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)

- Limited dig and haul to either off-site or to a consolidated on-site unit
- Surface waste removal and soil grading
- Groundwater monitoring

5.2.3 Bury Pit Landfill

The Bury Pit Landfill is shown in Figure 3-3. The medium of concern for the Bury Pit Landfill is the waste materials present in the soil and on the surface of this landfill. The areal extent of the Bury Pit Landfill in the CMS is approximately 3.8 acres with a waste thickness varying from 5 to 18 feet. COPCs in surface soil are below EGLE Part 201 non-residential screening criteria. Exceedances of tap water screening criteria for iron (not previously identified as a site-related constituent) were detected in wells downgradient of this unit in metals testing conducted in 2021. As noted in Section 3.4.3, the screening criterion for iron is a secondary (aesthetic) MCL.

Potential corrective measures technologies evaluated in this CMS to address potential human health exposure pathways include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Limited dig and haul to either off-site or to a consolidated on-site unit
- Surface waste removal and soil grading
- Groundwater monitoring

5.2.4 Basin Sludge Area

The Basin Sludge Area is shown in Figure 3-4. Unlike the landfills described above, the Basin Sludge Area does not have waste left in place. The areal extent of the former Basin Sludge Area is approximately 0.41 acres. The RI indicated that only one location had a result above the EGLE Part 201 non-residential screening criteria (6.21 mg/kg arsenic). Although sludge was reportedly removed, by-product lime material has eroded over the unit. The area is covered with a shallow layer (1 to 2 feet) of lime.

Because the southern part of the unit is covered by lime, the restoration of this area is dependent on the plans for the Lime Pile. After the Lime Pile is removed, soil in this area would be characterized.

Potential corrective measures technologies evaluated in this CMS to address the lime material include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Soil cap
- Off-site re-use of the lime by-product to be followed by soil characterization and, if necessary, additional corrective measures
- Groundwater monitoring

5.2.5 Mirror Lake

Mirror Lake is a small body of water located due south of the Lime Pile (see Figure 3-5). During the mid to late-1960s, lime from the Lime Pile was transported into Mirror Lake by

erosion and overland flow. Approximately one half of Mirror Lake received lime material. Erosion is no longer active as the south impoundment berm of the Lime Pile was repaired in the 1960s. There has been no apparent change in the extent of the lime sediment over the last four decades based on the appearance in aerial photographs in the CMS WP.

As sampling indicated in the RI, the lime sediment in Mirror Lake does not contain COPCs above screening criteria; however, the lime sediment has filled in the northern portion of the lake. The areal extent of the lime sediment in Mirror Lake is approximately 2.5 acres. The depth of lime is approximately 2 feet.

In July 2025, EGLE concurred with a proposed interim remedial measure (IRM) to restore approximately 2.5 acres of Mirror Lake via on-site consolidation into the Lime Pile. Following lime removal, the area will be restored to wetland habitat (Muskegon Conservation District, 2025). Dredging and on-site consolidation began in early September 2025. This IRM is the presumptive remedy for Mirror Lake.

Potential corrective measures technologies evaluated in this CMS to address the aesthetic restoration of Mirror Lake risk include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Consolidate into the Lime Pile and restore wetland habitat

5.2.6 Lime Pile

The Lime Pile is shown in Figure 3-6. The medium of concern at the Lime Pile is the lime by-product from the former acetylene process, which presents an aesthetic issue and had released constituents to groundwater (such as sulfide and thiocyanate). Other metals were not detected at concentrations of concern. Currently, if any constituents were to leach from the Lime Pile, they would be captured by the pump-and-treat system. An additional consideration for corrective measure alternatives analysis is the geotechnical stability of the pile and prevention of erosion onto adjacent areas.

The areal extent of the Lime Pile is estimated to be approximately 29 acres. Depth of lime based on the borings done in 2000 varied from 5 to 53 feet (Synagro, 2000). The base of the Lime Pile is understood to be native sand soils, but this may also include tree stumps and fallen timber as the Lime Pile footprint was expanded during its years of construction/accumulation.

Potential corrective measures technologies evaluated in this CMS to address the restoration of the Lime Pile area include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Off-site re-use of the lime by-product to be followed by soil characterization and, if necessary, additional corrective measures

5.2.7 Calcium Fluoride (CaF₂) Basin

The CaF₂ Basin is shown in Figure 3-6. The medium of concern for the CaF₂ Basin is the waste material in the impoundment. The impoundment was intended to precipitate CaF₂ by discharging water high in fluorides onto a part of the Lime Pile. However, the water also contained arsenic, which has deposited in the lime as well. The arsenic renders the

lime in the CaF₂ Basin unsuitable for off-site re-use. The areal extent of the CaF₂ Basin is approximately 7.5 acres. Past borings indicate that between 7 and 13.5 feet of lime are present.

As discussed in the RI report, arsenic concentrations in the impoundment exceeded EGLE Part 201 non-residential screening criteria in the surface material on the impoundment. There is no soil cover over the unit. A perimeter fence is present and maintained by Chemours and Lime Specialties Inc. Lime Pile reclamation activities have removed lime adjacent to the CaF₂ Basin and there is a topographic difference between the CaF₂ Basin (higher elevation) and the Lime Pile (lower elevation). As lime removal continues, this difference will increase, and the geotechnical stability of the impoundment will need to be considered.

Potential corrective measures technologies evaluated in this CMS to address potential human health and ecological exposure pathways include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Dig and haul either off-site or to a consolidated on-site unit
- Surface cover improvement with leachability evaluation
- Soil cap
- Groundwater monitoring

5.2.8 Pierson Creek Landfill

Pierson Creek Landfill is shown in Figure 3-7. The two media of concern for the Pierson Creek Landfill are the waste materials present in the footprint of the landfill and the constituents that have been released to groundwater that discharges to Pierson Creek. Surface and subsurface soil and groundwater contain COPCs above EGLE Part 201 non-residential screening criteria and tap water criteria.

The areal extent of the Pierson Creek Landfill is approximately 3.17 acres. The landfill consists of two contiguous waste disposal areas. The first is wastewater sludge that is in the fenced impoundment (approximately 2 acres). This wastewater sludge material has a soil cover of irregular depth (between 0 and 1 foot) and a waste thickness of up to 6 feet. The second part of the Pierson Creek Landfill (approximately 1.2 acres) contains a green material understood to be spent catalyst. Based on the groundwater monitoring data, only the wastewater sludge has released constituents (primarily PCE).

Potential corrective measures technologies evaluated in this CMS to address potential human health and ecological exposure pathways include the following:

- Institutional controls (site access controls, groundwater restrictions, deed restrictions including building restrictions and vapor mitigation, materials management plan, and Restrictive Covenant)
- MNA combined with a mixing zone determination (groundwater only)
- Geotextile cap
- Dig and haul to either off-site or consolidate to an on-site unit
- Groundwater monitoring

5.2.9 Pierson Creek

The media of concern in the vicinity of Pierson Creek Landfill are groundwater, surface water (tributaries to Pierson Creek), and sediment (near seeps of groundwater discharging to surface water). COPCs were not noted in the main channel of Pierson Creek surface water and sediment during the RFI; however, Pierson Creek is evaluated in this CMS in conjunction with Pierson Creek Landfill.

Potential corrective measures technologies evaluated in this CMS to address potential human health and ecological exposure pathways include the following:

- Institutional controls (site access controls, groundwater use restrictions, deed restrictions, and Restrictive Covenant)
- MNA combined with a mixing zone determination

5.2.10 Waste Neoprene Landfill

The Waste Neoprene Landfill (see Figure 3-4) is covered by the northern edge of the Lime Pile. Based on borings conducted in 2013, the Waste Neoprene Landfill is covered with between 1 and 5 feet of lime. Although the unit was reportedly excavated in 1976, fragments of neoprene waste were encountered during the 2013 borings suggesting that some material might remain under the lime. The areal extent of the former Waste Neoprene Landfill is 0.18 acres.

This unit is currently covered by lime, and the restoration of this area is dependent on the plans for the Lime Pile. After the Lime Pile is removed, remaining neoprene waste fragments (if any) would be removed, and the soil in this area would be characterized.

Potential corrective measures technologies evaluated in this CMS to address the lime material include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Soil cap
- Off-site re-use of the lime by-product to be followed by soil characterization and, if necessary, additional corrective measures
- Groundwater monitoring

5.2.11 Groundwater Plume from Former Manufacturing Area

Groundwater is a medium of concern downgradient of the former manufacturing area. The existing monitoring well network is sufficient to evaluate releases identified in site groundwater and provide appropriate monitoring at the site boundary. Similarly, there is an existing pump-and-treat system that is successfully containing the portions of the plume (see Figure 3-8) that exceed FAV criteria provided by MDEQ in response to a DuPont request for a Mixing Zone Determination for groundwater containing site-related VOCs flowing towards White Lake. As documented in the *2024 Groundwater Monitoring Report* (AECOM, 2025a), most constituents exhibit a declining concentration trend. MDEQ granted a mixing zone determination along with GSI criteria for site-related VOCs in a letter dated August 3, 2007. Chemours submitted a re-authorization request for the Mixing Zone Determination in February 2025. The request is currently under review by EGLE. The mixing zone only applies to the fringes of the impacted groundwater. This existing extraction system will also be evaluated in this CMS.

Potential corrective measures technologies evaluated in this CMS include the following:

- Institutional controls (site access controls, groundwater restrictions, deed restrictions including building restrictions and vapor mitigation, materials management plan, and Restrictive Covenant)
- Groundwater containment (active systems – such as the existing pump-and-treat system)
- MNA combined with a mixing zone determination

5.2.12 NPDES Impoundments and Corrosive Treatment

The Former NPDES Surface Impoundments consisted of a series of settling basins that were used to treat wastewater associated with the site manufacturing activities. The location of the former impoundments is shown on Figure 3-9. The wastewater was transported to the NPDES impoundments by a concrete and wood-lined ditch system.

This unit operated from the early 1960s until 1996 when facility operations were shut down. The ditch system is also located within the former manufacturing area.

In 1972, a 4-foot by 6-foot hole was found in the concrete bottom of the central basin. This hole was repaired, and groundwater was pumped until it was determined that the impact was limited in extent (DuPont letter to the MDEQ dated August 19, 1996).

Site-specific constituents were not detected in the soil samples collected during the RI; however, a single sample collected during the 2024 VIAP investigation exceeded screening criteria for benzene. Groundwater data from downgradient monitoring wells have shown some detections of PCE in groundwater slightly above screening criteria. The ditch system appears intact, and a release to the adjacent soil is not indicated; however, this unit is evaluated in conjunction with the groundwater plume from the Former Manufacturing Area.

Potential corrective measures technologies evaluated for the NPDES Impoundments and Corrosive Treatment area include the following:

- Institutional controls (site access controls, groundwater restrictions, deed restrictions including building restrictions and vapor mitigation, materials management plan, and Restrictive Covenant)
- Groundwater containment (active systems – such as the existing pump-and-treat system)
- MNA combined with a mixing zone determination

5.2.13 West Railcar Un/Loading Area

HCl liquid byproduct from the Freon® manufacturing process was stored in tanks, and railcars were loaded and unloaded in this area (see Figure 3-10). Soil samples collected during the RI and analyzed for pH did not indicate impacts from HCl; however, this unit is evaluated in conjunction with the groundwater plume from the former manufacturing area.

Potential corrective measures technologies evaluated for the West Railcar Un/Loading Area include the following:

- Institutional controls (site access controls, groundwater restrictions, deed restrictions including building restrictions and vapor mitigation, materials management plan, and Restrictive Covenant)
- Groundwater containment (active systems – such as the existing pump-and-treat system)
- MNA combined with a mixing zone determination

5.2.14 Copper Catalyst Release Area

During a site visit on May 8, 2024, EGLE personnel observed an area of gravel and soil with a light green color within the former Neoprene plant area (see Figure 3-11). EGLE personnel collected samples of the material for analysis for metals, total cyanide, and SVOCs. The analytical samples showed the material to be consistent with spent copper catalyst as metals (predominantly copper) were detected. Total cyanide and SVOCs were non-detect in the samples.

Based on this finding, EGLE identified this area as the “Copper Catalyst Release” area and requested that Chemours characterize the nature and extent of the material. Delineation sampling performed in August 2024 identified a small area (approximately 175 square feet) of shallow soil where copper exceeds the non-residential direct contact criterion.

Potential corrective measures technologies evaluated in this CMS to address the copper-bearing material include the following:

- Institutional controls (site access controls, deed restrictions, materials management plan, and Restrictive Covenant)
- Soil cap
- Off-site disposal
- On-site consolidation

6.0 Evaluation of Corrective Measure Alternatives

This section describes the approach and results of the corrective measure alternatives evaluation at each CMS unit.

Corrective measure alternatives were developed for each CMS unit from technologies that met the threshold criteria and have the potential to meet CAOs and MCSs based on unit, media, and waste characteristics. Table 6-1 lists the alternatives developed for each unit. The technologies considered in this CMS include the following:

- I&ECs (both existing and potential future controls) with groundwater monitoring
- Surface waste removal and grading
- Surface cover improvement with leachability study
- Soil cap
- Geotextile cap
- Off-site disposal
- Off-site re-use
- On-site consolidation
- Groundwater containment
- MNA with Mixing Zone Determination

6.1 Technologies Applicable to All CMS Units

6.1.1 Institutional and Engineering Controls

I&ECs are protective of public exposure to site hazards by restricting/limiting public access to the WMUs and will be a component of the selected corrective measure for each of the units. Institutional controls will restrict future land use to commercial or industrial activities for portions of the site and prohibit the use of groundwater site-wide as a drinking water supply. As discussed in previous sections of this report, there are existing I&ECs (i.e., fences, signs, sign-in procedures, health and safety plans, etc.) that currently restrict and control access to the site. These existing controls will be maintained and enhanced as appropriate to reduce or eliminate potential future exposure pathways. Future institutional controls (land-use restrictions such as limitations on building construction and/or a materials management plan; and water use restrictions) will also be implemented to supplement unit-specific alternatives. I&ECs would be implemented through an environmental covenant.

6.1.2 Site-Wide Groundwater Monitoring Program

As discussed in previous sections of this report, a site-wide groundwater monitoring program will be implemented. This program will likely be comprised of select monitoring well sampling (site perimeter, on-site, and CMS unit-specific) for selected COPCs at a proposed frequency. This program will be further evaluated in the pre-design and design

phases of CMI and effected during the CMI. The following CMS units have been identified to have potential localized groundwater impacts:

- Northeast Landfill
- North Landfill
- Bury Pit Landfill
- Lime Pile
- CaF₂ Basin
- Pierson Creek Landfill
- NPDES Impoundments and Corrosive Treatment
- West Railcar Un/Loading Area

Unit-specific wells at these locations may be included in the site-wide groundwater monitoring program.

6.2 Evaluation of Unit-Specific Corrective Measures

The potential corrective measures alternatives developed for each unit were evaluated using the following balancing criteria from EPA guidance:

- Long-term reliability and effectiveness
- Reduction in the toxicity, mobility, or volume of wastes
- Short-term effectiveness
- Implementability
- Cost
- State and Community Acceptance

The evaluation of the cost criteria was supported by preliminary conceptual design cost estimates that were generated based on available site information, technology features, and engineer's opinion of cost. Details of the cost calculations are presented in Appendix C.

The ability of the corrective measures alternatives to meet the balancing criteria was assessed qualitatively for each WMU/AOC as detailed in the following sections. Table 6-1 summarizes the rationale used in corrective measures evaluation and indicates the selected alternative for each CMS unit. The selected corrective measures for the site consist of I&ECs (both existing and potential future controls) and site wide groundwater monitoring plus off-site re-use, MNA with mixing zone determination, on-site consolidation, surface waste removal and soil grading, and capping as appropriate for each unit.

6.2.1 Northeast Landfill

Three potential corrective measures alternatives were developed for Northeast Landfill: surface waste removal and soil grading, off-site disposal, and on-site consolidation. Each alternative includes I&ECs, and all except off-site disposal include groundwater monitoring.

The three alternatives are effective and reliable long-term. Potential infiltration through waste material and subsequent discharge to groundwater are addressed by containment within the capture zone of the pump-and-treat system and the groundwater monitoring program would identify if this occurs. The surface waste removal and soil grading and the on-site consolidation alternatives would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy. Each alternative reduces exposure potential for human and animal receptors; off-site disposal reduces mobility, toxicity, and volume at the remediation site but moves the impacted material into another community.

The three alternatives are effective short-term. The surface waste removal and soil grading and the on-site consolidation alternatives would require a brief vegetation establishment period. However, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil.

The three alternatives are readily implemented. Off-site disposal would have a greater impact on the local community during implementation because of truck traffic. The cost to implement is lowest for surface waste removal and soil grading and highest by an order of magnitude for off-site disposal.

The three alternatives comply with regulatory requirements. Surface waste removal and soil grading would have minimal impact on the community during construction. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected.

The selected corrective measure for the Northeast Landfill is I&ECs, groundwater monitoring, and surface waste removal and soil grading.

6.2.2 North Landfill

Three potential corrective measures alternatives were developed for North Landfill: surface waste removal and soil grading, off-site disposal, and on-site consolidation. Each alternative includes I&ECs, and all except off-site disposal include groundwater monitoring.

The three alternatives are effective and reliable long-term. Infiltration through waste material and subsequent discharge to groundwater should be negligible because no exceedances of soil screening criteria or primary MCLs have been identified for this unit. The surface waste removal and soil grading and the on-site consolidation alternatives would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy. Each alternative reduces exposure potential for human and animal receptors; off-site disposal reduces mobility, toxicity, and volume at the remediation site but moves the impacted material into another community.

The three alternatives are effective short-term. The surface waste removal and soil grading and the on-site consolidation alternatives would require a brief vegetation establishment period. However, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil.

The three alternatives are readily implemented. Off-site disposal would have a greater impact on the local community during implementation because of truck traffic. The cost

to implement is lowest for surface waste removal and soil grading and highest by an order of magnitude for off-site disposal.

The three alternatives comply with regulatory requirements. Surface waste removal and soil grading would have minimal impact on the community during construction. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected.

The selected corrective measure for the North Landfill is I&ECs, groundwater monitoring, and surface waste removal and soil grading.

6.2.3 Bury Pit Landfill

Three potential corrective measures alternatives were developed for Bury Pit Landfill: surface waste removal and soil grading, off-site disposal, and on-site consolidation. Each alternative includes I&ECs, and all except off-site disposal include groundwater monitoring.

The three alternatives are effective and reliable long-term. Infiltration through waste material and subsequent discharge to groundwater should be negligible, as no exceedances of soil screening criteria or primary MCLs have been identified for this unit. The surface waste removal and soil grading and the on-site consolidation alternatives would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy.

Each alternative reduces exposure potential for human and animal receptors; off-site disposal reduces mobility, toxicity, and volume at the remediation site but moves the impacted material into another community.

The three alternatives are effective short-term. The surface waste removal and soil grading and the on-site consolidation alternatives would require a brief vegetation establishment period. However, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil.

The three alternatives are readily implemented. Off-site disposal would have a greater impact on the local community during implementation because of truck traffic. The cost to implement is lowest for surface waste removal and soil grading and highest by an order of magnitude for off-site disposal.

The three alternatives comply with regulatory requirements. Surface waste removal and soil grading would have minimal impact on the community during construction. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected.

The selected corrective measure for the Bury Pit Landfill is I&ECs, groundwater monitoring, and surface waste removal and soil grading.

6.2.4 Basin Sludge Area

Two potential corrective measures alternatives were developed for the Basin Sludge Area: soil cap and off-site re-use. Each alternative includes I&ECs and groundwater monitoring.

Both alternatives are effective and reliable long-term. The soil cap would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy. Off-site re-use of the lime would eliminate the source of constituents over time by removing the lime from the site as a beneficial re-use of the product. After lime removal, the underlying soil would be characterized and the need for additional corrective measures considered.

Both alternatives reduce potential exposure for human and animal receptors. The cap alternative also reduces mobility of the lime but does not reduce toxicity or volume. Off-site re-use reduces mobility, toxicity, and volume over time.

Both alternatives are effective short-term. The soil cap would require a vegetation establishment period; however, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil. The off-site re-use alternative immediately begins reducing the volume of impacted material.

Both alternatives are readily implemented. The cost is lower for off-site re-use.

Both alternatives comply with regulatory requirements and have minimal impact on the local community. Although the off-site re-use alternative does generate truck traffic, the number of trucks per day is limited.

The selected corrective measure for the Basin Sludge Area is I&ECs, groundwater monitoring, and off-site re-use.

6.2.5 Mirror Lake

One corrective measure alternative was developed and is being implemented for Mirror Lake: on-site consolidation into the Lime Pile with habitat restoration, I&ECs, and groundwater monitoring.

This alternative is effective long-term by removing lime material from the lake. The consolidated material will be re-used off-site, further enhancing the long-term effectiveness by re-using the lime as a product.

On-site consolidation reduces mobility and exposure potential. Over time, the volume of material is reduced as it is shipped off-site for re-use.

This alternative is effective short-term by removing lime material from the lake and re-establishing native habitat. It is readily implemented and at relatively low cost. On-site consolidation meets regulatory requirements and should be accepted by the community as it restores the lake and wetland habitat and removes lime material from the site for beneficial re-use.

The selected corrective measure for Mirror Lake is on-site consolidation into the Lime Pile with habitat restoration, I&ECs, and groundwater monitoring. The on-site consolidation is currently being implemented by Chemours.

6.2.6 Lime Pile

One corrective measure alternative was developed for the Lime Pile: off-site re-use, I&ECs, and groundwater monitoring.

This alternative is effective long-term by removing the lime material from the site as a beneficial re-use of the product. After lime removal, the underlying soil would be characterized and the need for additional corrective measures considered.

Off-site re-use reduces mobility, toxicity, and volume over time. It is effective in the short-term as it immediately begins reducing the volume of impacted material and site control is managed by the company performing the lime sales.

This alternative is readily implemented and at relatively low cost. It meets regulatory requirements and should be accepted by the community because the lime material is removed from the site for beneficial re-use. Although the off-site re-use alternative does generate truck traffic, the number of trucks per day is limited.

The selected corrective measure for the Lime Pile is off-site re-use, I&ECs, and groundwater monitoring.

6.2.7 Calcium Fluoride (CaF₂) Basin

Four remedial alternatives were developed for the CaF₂ Basin: surface cover improvement with leachability evaluation, soil cap; off-site disposal, and on-site consolidation. Each alternative includes I&ECs, and all except off-site disposal include groundwater monitoring.

The four alternatives are effective long-term. All except off-site disposal would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy.

Each alternative would reduce mobility and exposure potential for human and animal receptors. Specifically, a vegetated topsoil cover would reduce the potential for particulate exposure to the arsenic-impacted lime. Off-site disposal also reduces toxicity and volume at the remediation site but moves the impacted material into another community.

Each of the four alternatives would be effective short-term. Surface cover improvement, soil cap, and on-site consolidation would require a vegetation establishment period; however, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil. The off-site re-use alternative immediately begins reducing the volume of impacted material.

The alternatives are readily implemented. Off-site disposal would have a greater impact on the local community during implementation because of truck traffic. The cost to implement is lowest for surface cover improvement by one to two orders of magnitude compared with the other three alternatives. The most expensive alternative to implement would be off-site disposal.

The four alternatives meet regulatory requirements. Surface cover, soil cap, and on-site consolidation would have minimal impacts on the community during implementation. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected.

The selected corrective measure for the CaF₂ Basin is I&ECs, groundwater monitoring, ongoing maintenance of the fencing, an improvement to the surface cover, and an evaluation of leachability with subsequent modifications to the cover system if needed.

6.2.8 Pierson Creek Landfill

Three corrective measures alternatives were developed for Pierson Creek Landfill: geotextile cap, off-site disposal, and on-site consolidation. Each alternative includes I&ECs, and all except off-site disposal include groundwater monitoring.

The three alternatives would be effective long-term. The geotextile cap and on-site consolidation would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy.

Each alternative reduces constituent mobility and exposure potential for human and animal receptors; off-site disposal reduces mobility, toxicity, and volume at the remediation site but moves the impacted material into another community.

The three alternatives are effective short-term. The geotextile cap and on-site consolidation alternatives would require a brief vegetation establishment period. However, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil.

The three alternatives are readily implemented. Off-site disposal would have a greater impact on the local community during implementation because of truck traffic. The cost to implement is similar for geotextile cap and on-site consolidation, about 5 times lower than for off-site disposal.

The three alternatives comply with regulatory requirements. Geotextile cap or on-site consolidation would have minimal impact on the community during construction. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected.

The selected corrective measure alternative for Pierson Creek Landfill is I&ECs, groundwater monitoring, and a geotextile cap.

6.2.9 Pierson Creek

One corrective measure alternative was developed for Pierson Creek: MNA with mixing zone determination, I&ECs, and groundwater monitoring.

This alternative would be effective long-term. Nearby Pierson Creek Landfill is the likely source of constituents found in Pierson Creek, and the selected corrective measure for the landfill would limit infiltration through the landfill to groundwater, minimizing the source of constituents. In addition, primary COPCs at this location readily degrade over time. The previously approved mixing zone determination for the groundwater plume to White Lake can also be applied to Pierson Creek by using the established mixing zone screening criteria as MCSs that are protective of receptors in and around the creek.

MNA is a proven technology that reduces volume and toxicity over time. For this site, the mixing zone determination that shows current COPC concentrations are effective demonstrates short-term effectiveness. MNA can be readily implemented at a reasonable cost and meets regulatory requirements when enhanced with the mixing zone determination. This technology will have minimal impact on the community.

The selected corrective measure for Pierson Creek is I&ECs, groundwater monitoring, and MNA with mixing zone determination.

6.2.10 Waste Neoprene Landfill

Two potential corrective measures alternatives were developed for the Waste Neoprene Landfill: soil cap and off-site re-use. Each alternative includes I&ECs and groundwater monitoring.

Both alternatives are effective and reliable long-term. The soil cap would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy. Off-site re-use of the lime would eliminate the source of constituents over time and is a beneficial re-use of the product. After lime removal, the underlying soil would be characterized and the need for additional corrective measures considered.

Both alternatives reduce potential exposure for human and animal receptors. The cap alternative also reduces mobility of the lime but does not reduce toxicity or volume. Off-site re-use reduces mobility, toxicity, and volume over time.

Both alternatives are effective short-term. The soil cap would require a vegetation establishment period; however, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil. The off-site re-use alternative immediately begins reducing the volume of impacted material.

Both alternatives are readily implemented. The cost is lower for off-site re-use.

Both alternatives comply with regulatory requirements and have minimal impact on the local community. Although the off-site re-use alternative does generate truck traffic, the number of trucks per day is limited.

The selected corrective measure for the Waste Neoprene Landfill is I&ECs, groundwater monitoring, and off-site re-use.

6.2.11 Groundwater Plume from Former Manufacturing Area

Two potential corrective measures alternatives were developed for the Groundwater Plume from Former Manufacturing Area: MNA with mixing zone determination and groundwater containment and treatment. Each alternative includes I&ECs and groundwater monitoring.

Both potential technologies are effective long-term. The existing groundwater containment and treatment system has proven effective based on years of data. MNA with mixing zone determination would be effective for some COPCs at this location that degrade readily over time.

Both alternatives reduce volume and toxicity. Groundwater containment and treatment also reduces mobility.

In the short term, the existing mixing zone determination shows that COPC concentrations are protective of human health and the environment for both alternatives. Groundwater containment and treatment produces an immediate reduction in constituent volumes.

Both alternatives are readily implemented with the groundwater containment and treatment alternative using the existing, proven system. Cost over 30 years is estimated at 16 times higher for containment and treatment. Chemours will continue to monitor groundwater at the site and in the future may recommend that the treatment system be shut down and the remedy converted to MNA.

Both alternatives comply with regulatory requirements. The community is likely to prefer groundwater containment and treatment as it permanently removes constituents from the site.

The selected corrective measure for the Groundwater Plume from Former Manufacturing Area is I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system. If site conditions continue to improve, Chemours may petition in the future to convert this measure to MNA with I&ECs.

6.2.12 NPDES Impoundments and Corrosive Treatment

The NPDES Impoundments and Corrosive Treatment area is within the capture zone of the existing groundwater containment and treatment system. As such, the potential corrective measures alternatives developed for this unit are the same as those for the Groundwater Plume from Former Manufacturing Area: MNA with mixing zone determination and groundwater containment and treatment. Each alternative includes I&ECs and groundwater monitoring.

Both potential technologies are effective long-term. The existing groundwater containment and treatment system has proven effective based on years of data. MNA with mixing zone determination would be effective for some COPCs at this location that degrade readily over time.

Both alternatives reduce volume and toxicity. Groundwater containment and treatment also reduces mobility.

In the short term, the existing mixing zone determination shows that COPC concentrations are protective of human health and the environment for both alternatives. Groundwater containment and treatment produces an immediate reduction in constituent volumes.

Both alternatives are readily implemented with the groundwater containment and treatment alternative using the existing, proven system. The cost for remedy implementation at this unit is included in the cost estimate for the Groundwater Plume from Former Manufacturing Area. Cost over 30 years is estimated at 16 times higher for containment and treatment. Chemours will continue to monitor groundwater at the site and in the future may recommend that the treatment system be shut down and the remedy converted to MNA.

Both alternatives comply with regulatory requirements. The community is likely to prefer groundwater containment and treatment as it permanently removes constituents from the site.

The selected corrective measure for the NPDES Impoundments and Corrosive Treatment area is I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system. If site conditions continue to improve, Chemours may petition in the future to convert this measure to MNA with I&ECs.

6.2.13 West Railcar Un/Loading Area

The West Railcar Un/Loading Area is within the capture zone of the existing groundwater containment and treatment system. As such, the potential corrective measures alternatives developed for this unit are the same as those for the Groundwater Plume from Former Manufacturing Area: MNA with mixing zone determination and groundwater containment and treatment. Each alternative includes I&ECs and groundwater monitoring.

Both potential technologies are effective long-term. The existing groundwater containment and treatment system has proven effective based on years of data. MNA with mixing zone determination would be effective for some COPCs at this location that degrade readily over time.

Both alternatives reduce volume and toxicity. Groundwater containment and treatment also reduces mobility.

In the short term, the existing mixing zone determination shows that COPC concentrations are protective of human health and the environment for both alternatives. Groundwater containment and treatment produces an immediate reduction in constituent volumes.

Both alternatives are readily implemented with the groundwater containment and treatment alternative using the existing, proven system. The cost for remedy implementation at this unit is included in the cost estimate for the Groundwater Plume from Former Manufacturing Area. Cost over 30 years is estimated at 16 times higher for containment and treatment. Chemours will continue to monitor groundwater at the site and in the future may recommend that the treatment system be shut down and the remedy converted to MNA.

Both alternatives comply with regulatory requirements. The community is likely to prefer groundwater containment and treatment as it permanently removes constituents from the site.

The selected corrective measure for the West Railcar Un/Loading Area is I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system. If site conditions continue to improve, Chemours may petition in the future to convert this measure to MNA with I&ECs.

6.2.14 Copper Catalyst Release Area

Three potential corrective measures alternatives were developed for the Copper Catalyst Release Area: soil cap, off-site disposal, and on-site consolidation. Each alternative includes I&ECs and the soil cap and on-site consolidation alternatives include groundwater monitoring.

The three alternatives are effective and reliable long-term. Infiltration through waste material and subsequent discharge to groundwater are addressed by containment within the capture zone of the pump-and-treat system. The soil cap and the on-site consolidation alternatives would require ongoing maintenance, which would be included as part of the environmental covenant comprised in the I&ECs element of the remedy. Each alternative reduces exposure potential for human and animal receptors; off-site disposal reduces mobility, toxicity, and volume at the remediation site but moves the impacted material into another community. However, for this unit, the volume of waste to be removed is limited.

The three alternatives are effective short-term. The soil cap and the on-site consolidation alternatives would require a brief vegetation establishment period. However, risk to the remedy during this period is lessened by the sandy soils native to the area, which reduce the chance of weather-related effects on surface soil. Off-site disposal immediately removes the source of constituents.

The three alternatives are readily implemented. Off-site disposal would have minimal impact on the local community during implementation because only one truckload of

material would be removed. The cost to implement is lowest for off-site disposal and higher by an order of magnitude for soil cap and on-site consolidation, which have similar costs.

The three alternatives comply with regulatory requirements and would have minimal impact on the community during construction. General community preference for removal of impacted materials is considered along with the effects of truck traffic to the local community and transfer of impacted materials to another community if off-site disposal is selected. For this analysis, the small volume of material to be removed is a key factor.

The selected corrective measure for the Copper Catalyst Release Area is I&ECs and select removal of surface material for off-site disposal. As the material containing constituents above Part 201 soil to groundwater criteria will be removed, groundwater monitoring is not included in the selected corrective measures for this area.

7.0 Cost Estimates

CMS-level cost estimates were generated based on available site information, technology features, and engineer's opinion of cost for each corrective measure alternative developed for this CMS (see Appendix C). Cost estimates were initially completed in 2020, and updates were made in 2025. The estimates comprise capital costs and annual operation and maintenance (O&M) costs. Capital costs include pre-design, design, institutional controls establishment, and construction costs. Annual O&M costs include O&M, institutional controls maintenance, and long-term monitoring (LTM) requirements.

The total cost (in net present value) for the proposed remedies is approximately \$4.1 million in capital cost and \$9.2 million in annual O&M cost. This cost should be considered an order-of-magnitude estimate. Cost estimates will be updated in the design phase when more information is available. Chemours anticipates that financial assurance will be required for the total estimated cost of \$13.3 million. Following EGLE approval of the cost estimate included in the CMI Work Plan, Chemours will post an appropriate financial assurance mechanism as required by Paragraph 9.1.1 of the Corrective Action Consent Order (EGLE, 2024).

8.0 Recommended Alternatives

As discussed in Section 6.0, an evaluation of potential corrective measures has been performed to select effective corrective measure alternatives meeting the threshold criteria. The selected corrective measure alternatives are as follows:

- Northeast Landfill: I&ECs, groundwater monitoring, and surface waste removal and soil grading.
- North Landfill: I&ECs, groundwater monitoring, and surface waste removal and soil grading.
- Bury Pit Landfill: I&ECs, groundwater monitoring, and surface waste removal and soil grading.
- Pierson Creek Landfill: I&ECs, groundwater monitoring, and a geotextile cap.
- Pierson Creek: I&ECs, groundwater monitoring, and MNA with mixing zone determination.
- Basin Sludge Area: I&ECs, groundwater monitoring, and off-site re-use.
- Waste Neoprene Landfill: I&ECs, groundwater monitoring, and off-site re-use.
- Lime Pile: I&ECs, groundwater monitoring, and off-site re-use; the underlying material will be characterized after the lime by-product has been removed to the extent possible and further corrective measures applied if necessary.
- Mirror Lake: I&ECs, groundwater monitoring, and on-site consolidation with habitat restoration. On-site consolidation is currently underway and is not part of the cost calculation.
- CaF₂ Basin: I&ECs, groundwater monitoring, ongoing maintenance of the fencing, an improvement to the surface cover, and an evaluation of leachability with subsequent modifications to the cover system if needed.
- Groundwater Plume from Former Manufacturing Area: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- National Pollutant Discharge Elimination System (NPDES) Impoundments and Corrosive Treatment: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- West Railcar Un/Loading Area: I&ECs, groundwater monitoring, and groundwater containment and treatment in the existing groundwater treatment system.
- Copper Catalyst Storage Area: I&ECs and select removal of surface material for off-site disposal.

As detailed in Section 7.0, the total cost for the proposed remedies is approximately \$4.1 million in capital cost and \$9.2 million in annual operation and maintenance cost.

8.1 Schedule

Upon approval of the CMS, a CMI work plan will be prepared in accordance with EGLE and EPA Guidance. Assuming receipt of written approval of the selected corrective measures alternatives in February 2026, the CMI work plan will be submitted in June 2026 (Section 8.5 of the CACO notes a 120-day timeframe). The CMI tasks (pre-design investigations, design, and construction) will then commence upon approval of the CMI work plan, which will include a proposed implementation schedule.

Project tasks and completion dates may change as data are evaluated and pending EGLE comments. If any schedule updates are required, the updates will be communicated to EGLE and documented in the required status reports.

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