709139

PROPOSED PLAN

FOREST WASTE PRODUCTS SUPERFUND SITE

OTISVILLE, MICHIGAN

EPA SITE ID: MID980410740

PREPARED BY:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

1,2-DCA	1,2- dichloroethane
AOP	Advanced Oxidation Process
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-dichloroethene
cm/s	centimetres per second
COCs	Contaminants of Concern
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FWCC	Forest Waste Coordinating Committee
gpm	Gallons Per Minute
GWAL	Groundwater Action Levels
HHRA	Human Health Risk Assessment
HI	Hazard Index
HDPE	High-Density Polyethylene
ICs	Institutional Controls
ISCO	In-Situ Chemical Oxidation
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	nanograms per liter
NPL	National Priorities List
O&M	Operation & Maintenance
OU	Operable Unit
PRB	Permeable Reactive Barrier
PBB	Polybrominated Biphenyl
PCB	Polychlorinated Biphenyl
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PRP	Potentially Responsible Party
PVC	polyvinyl chloride
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RDWC	Residential Drinking Water Criteria
RGs	Remediation Goals
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

SRD	Substantive Requirements Document
µg/L	micrograms per liter
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds

1 INTRODUCTION

The United States Environmental Protection Agency (EPA) is issuing this Proposed Plan to present EPA's Preferred Interim Alternative for Operable Unit 2 (OU-2), specifically the groundwater at the Forest Waste Products Superfund Site (Site) in Otisville, Genesee County, Michigan. This Proposed Plan provides background information about the Site, describes the various interim cleanup alternatives considered for preventing the further migration of and cleaning up of 1,4-dioxane in groundwater, and identifies EPA's Preferred Interim Alternative. This Proposed Plan is being issued by EPA, the lead agency for Site activities. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) is the support agency. EPA, in consultation with EGLE, will decide on the selected interim remedy for the groundwater at OU-2 after reviewing and considering all information submitted during a 30-day public comment period. The public comment period runs from May 11 through June 10, 2026.

EPA encourages the public to review and comment on this Proposed Plan. EPA also encourages community members to attend a public meeting at Forest Township Hall on May 20, 2026. The public meeting begins at 7 pm. EPA will accept oral comments during the public meeting and written comments at any time during the public comment period.

EPA's final decision on the interim remedy for OU-2 groundwater will be presented in an EPA document called an Interim Record of Decision (ROD). The Interim ROD will include a Responsiveness Summary that summarizes EPA's responses to public comments on this Proposed Plan. Based on new information and/or public comments received during the public comment period, EPA may modify the Preferred Alternative or select a different alternative, so it is important for the public to review and comment on all the alternatives presented in this Proposed Plan.

In 1986, EPA signed a ROD for the lagoon Operable Unit that required initial actions including removal, treatment, and off-site disposal of lagoon wastes, and disposal of the excavated sludge, sediment, and soil at a landfill permitted under the Resource Conservation and Recovery Act (RCRA). In 1988, EPA signed a ROD for the entire site that included the removal and off-site treatment of drums and contaminated soil from the landfill, construction of a RCRA cap over the on-site landfill, installation of a slurry wall vertical barrier around the landfill, collection and treatment of groundwater, the establishment of groundwater action levels (GWALs), fencing, and placement of deed restrictions as Institutional Controls (ICs) on the Forest Waste property. GWALs are based on Federal Maximum Contaminant Levels (MCLs) and State criteria, if more stringent, at the time of the ROD. Subsequent to the 1988 ROD, the site was divided into two Operable Units. OU-1 includes the Forest Waste site property and landfill, while OU-2 now addresses Site groundwater. The OU-1 remedy for the lagoon and landfill has been successfully implemented, and no further remedial action is recommended. In a 2005 ROD Amendment, EPA selected in-situ chemical oxidation (ISCO) treatment as the OU-2 groundwater remedy. Implementation of this remedy was suspended in 2011 following the discovery of 1,4-dioxane in groundwater onsite. Therefore, additional remedial action for the OU-2 groundwater is still needed.

EPA's preferred interim cleanup alternative for the groundwater is **Alternative 2: groundwater extraction and ex-situ treatment**. More details about the Preferred Interim Alternative and the other cleanup alternatives considered for OU-2 are provided later in this Proposed Plan. The estimated cost to implement the Preferred Interim Alternative is $24,349,000.

This document explains the rationale for proposing the Preferred Interim Alternative. This document also provides information regarding Site background and previous investigations and response actions performed at the Site, including information from the Site Remedial Investigation (RI) and documents contained in the Administrative Record (AR) file for the Site. EPA is issuing this Proposed Plan as part of its public participation requirements under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). EPA and EGLE encourage the public to review the documents in the AR to gain a more comprehensive understanding of the Site and Superfund activities conducted at the Site to date. EPA also invites the public to review and comment on all alternatives considered in this Proposed Plan.

All site related documents for the Forest Waste Products Superfund Site are available online at: https://www.epa.gov/superfund/forest-waste-products under the Site Documents & Data tab on the left side of the screen. Specific documents can be found by searching the title or document ID as identified in the Administrative Record.

The official information repository is located at:

EPA Region 5 Records Center
77 W. Jackson Blvd. (SRC-7J)
Chicago, IL 60604
312-886-0900
Mon-Fri: 8 a.m. to 4 p.m. – Call for appointment

2 SITE BACKGROUND

The Site is located in Otisville, Genesee County, Michigan, approximately 20 miles northeast of Flint (Figure 1). The area considered to be part of the original Site covers 112 acres (see Figure 2). An 80-acre parcel (formerly used for farming) north of the original 112-acre Site was purchased in 1995 by the Forest Waste Coordinating Committee (FWCC), a group of Potentially Responsible Parties (PRP)s for the Site, to provide a source of fill and clay for the landfill cap required by the ROD. This 80-acre parcel also includes part of a small man-made lake ("Unnamed Lake"), which is hydraulically connected to the wetlands east of the Site. The Unnamed Lake is not attractive for recreational usage, possibly because of its remote location.

Waste disposal occurred on-site in a landfill and in nine lagoons between 1973 and 1978. The disposed wastes included oils, plating waste, metal sludge, brewery waste, sewage sludge, resin and paint waste, septic tank waste, phosphate-zinc waste, spent sulfuric acid, caustic pipe cleaning water, sauerkraut brine, fly ash, and wastes contaminated with polychlorinated biphenyls (PCBs) and polybrominated biphenyls (PBBs). Most liquids were disposed of in the lagoons, although disposal of liquids into the landfill and onto the surrounding ground may have occurred. Drummed wastes were buried in the landfill. Incoming wastes were not closely screened, and the landfill area was poorly managed. Trenches were randomly dug then filled with a mixture of wastes. EPA placed the Site on the National Priorities List (NPL) on September 8, 1983.

Because the Site is large and complex, EPA, over time, has divided the Site into operable units, or OUs, to address the contamination at the Site. "Operable units" are an environmental term to address geographic areas, specific problems, or areas where a specific action is required. The first OU at the Site, the lagoon OU, was designated to address risks from the lagoons and the landfill on-site, including liquid wastes, sludge, sediment, soil, drums and other waste material and debris. In accordance with the 1984 Initial Remedial Measure (IRM) ROD, EPA constructed a fence around the Site. In 1988, EPA signed a site-wide ROD that was meant to address risks associated with the source areas at the Site, including the removal and off-site treatment of drums and contaminated soil from the landfill, construction of a RCRA-compliant landfill cap, installation of a slurry wall vertical barrier around the landfill, collection and treatment of groundwater, the establishment of GWALs, fencing, and placement of deed restrictions as ICs on the Forest Waste property. In 1988 and 1989, excavation, removal, and disposal of the lagoons and all material contained in them was completed by a group of potentially responsible parties (a subset of the current FWCC) in accordance with the 1986 lagoon ROD and the 1988 site-wide ROD and pursuant to the terms of a Unilateral Administrative Order. Following each phase of excavation, confirmatory soil samples were collected, and the procedure was repeated until the soil cleanup levels were achieved. As a result of these procedures, the removal activities were conducted over multiple construction periods. Confirmatory samples were analyzed for the organic and inorganic compounds identified in the 1986 and 1988 RODs and the 1988 Design Analysis Report to verify the successful completion of the removal to the soil cleanup levels. In 1993, the FWCC completed the off-site treatment of drums and removal of contaminated soil hotspots from the landfill required in the 1986 and 1988 RODs. This remedial action was successful in removing the more highly concentrated wastes. In 1997, the FWCC completed construction of the landfill cap and fencing around the landfill in accordance with the decision documents under the terms of the 1995 Consent Decree.

The 1988 site-wide ROD was revised by a 1993 Explanation of Significant Difference, which eliminated the requirement for a vertical barrier wall, and amended by a 2005 ROD Amendment, which updated the cleanup goals to the current GWALs and selected in-situ chemical oxidation (ISCO) treatment as a groundwater remedy for OU-2. The FWCC completed a pilot-scale test for the groundwater component of the remedy between May 2005 and June 2006. The technology used pure oxygen and a groundwater probe containing a special membrane to transfer the oxygen to the groundwater without generating bubbles. The technology was intended to result in high oxygen concentrations in the vicinity of the probes, which then disperse as the groundwater migrates downgradient. It was thought the increase in dissolved oxygen would increase the degradation of VC and other VOCs in groundwater that were a problem near the Site boundaries. The results of the pilot-scale test demonstrated that the reducing conditions immediately downgradient of the landfill had changed and the remedy selected in the 2005 ROD Amendment was not appropriate under conditions at that time.

From 2007 to 2010, the FWCC performed bench-scale and pilot testing on the alternative groundwater remedy selected in the 2005 ROD Amendment, using potassium permanganate as a chemical oxidant to cut off migration of contaminants from the landfill. The objective of the in-situ treatment was to create a continuous zone where contaminants would be oxidized. Sampling and analysis conducted after treatment indicated effectiveness in treating VC and cis-1,2-dichloroethene (cis-1,2-DCE), but ineffective in treating 1,2- dichloroethane (1,2-DCA). Subsequent to the pilot testing, implementation of the 2005 selected remedy was suspended altogether in 2011 following the discovery of 1,4-dioxane in groundwater onsite. Therefore, additional remedial action for the OU-2 groundwater is still needed and is being selected in this Interim ROD Amendment.

2.1 History of 1,4-Dioxane Use and Detections

1,4-Dioxane is a colorless, flammable liquid with a faint, pleasant odor. It is a synthetic industrial chemical used as a solvent for extracting animal and vegetable oils and in the formulation of inks, coatings, and adhesives. Historically, it has been used primarily as a solvent in paints, varnishes, lacquers, cleaners and as a solvent in the processing of crude petroleum, petroleum refining, petrochemicals, pulp and paper, often with chlorinated solvents. Given the known disposal practices at the Site, EPA requested the addition of 1,4-dioxane to the groundwater monitoring program in 2011. During the 2011 sampling event, 1,4-dioxane was detected above the EGLE's residential drinking water criterion of 7.2 micrograms per liter (µg/L) in monitoring wells onsite. Currently, there is no federal drinking water standard for 1,4-dioxane, however toxicity information exists for 1,4-dioxane that allows for EPA to assess the current and future potential risk to Site receptors.

The RI was completed in 1987 (CH2M Hill, 1987). Based on the results of the RI and 1986 and 1988 ROD, the following were determined to be the Site-related contaminants of concern (COCs) that prompted actions to address them:

<u>Landfill and Soil</u>

1,1,1-TRICHLOROETHANE	ENDOSULFAN SULFATE	CADMIUM
2-BUTANONE	ETHYLBENZENE	CHROMIUM
4-METHYL-2-PENTANONE	FLUORANTHENE	COBALT
ACETONE	INDENO(1,2,3-CD) PYRENE	CYANIDE

BENZENE	P,P'-DDE	IRON
BENZO(B)FLUORANTHENE	P,P'-DDT	LEAD
BENZO(GHI)PERYLENE	POLYBROMINATED BIPHENYLS	MAGNESIUM
BENZO(K)FLUORANTHENE	POLYCHLORINATED BIPHENYLS	MANGANESE
BENZO[A]ANTHRACENE	PAHs	MERCURY
BENZO[A]PYRENE	PYRENE	NICKEL
BIS(2-ETHYLHEXYL)PHTHALATE	STYRENE	POTASSIUM
BUTYL BENZYL PHTHALATE	TOLUENE	SELENIUM
CHLORDANE	XYLENE	SILVER
CHRYSENE	ALUMINUM	SODIUM
DIBENZO(A,H)ANTHRACENE	ANTIMONY	THALLIUM
DIBUTYL PHTHALATE	ARSENIC	TIN
DICHLOROMETHANE	BARIUM	VANADIUM
DIELDRIN	BERYLLIUM	ZINC
ENDOSULFAN	COPPER	

<u>Groundwater</u>

1,1,1-TRICHLOROETHANE	BIS(2-ETHYLHEXYL)PHTHALATE	CHLORDANE
1,1-DICHLOROETHANE	DI-N-OCTYL PHTHALATE	DIELDRIN
1,2-DIPHENYLHYDRAZINE	DICHLOROMETHANE	ENDOSULFAN
1,4-DIOXANE	PHENOL	LEAD
2-BUTANONE	TETRACHLOROETHENE	NICKEL
2-HEXANONE	TOLUENE	P,P'-DDE
2-METHYLPHENOL	TRANS-1,2-DICHLOROETHENE	P,P'-DDT
4-METHYLPHENOL	TRICHLOROETHENE	POLYBROMINATED BIPHENYLS
ACETONE	ARSENIC	PAHs
BENZENE	BARIUM	VOCs
BENZOIC ACID		

<u>Lagoons (sludge)</u>

2,4-DIMETHYLPHENOL	CADMIUM	NICKEL
4-METHYL-2-PENTANONE	COBALT	P,P'-DDE
3,5,5-TRIMETHYLCYCLOHEX-2-EN-1-ONE	COPPER	P,P'-DDT

1,1,1-TRICHLOROETHANE	CYANIDE	POLYBROMINATED BIPHENYLS
ACETONE	CHRYSENE	PCBs
ALUMINUM	DIBUTYL PHTHALATE	POTASSIUM
ANTIMONY	DICHLOROMETHANE	PYRENE
ARSENIC	DIETHYL PHTHALATE	SODIUM
BARIUM	DI-N-OCTYL PHTHALATE	SELENIUM
BENZOIC ACID	DIBENZO(A,H)ANTHRACENE	SILVER
BIS(2-ETHYLHEXYL)PHTHALATE	DIELDRIN	STYRENE
BERYLLIUM	ETHYLBENZENE	THALLIUM
BENZENE	ENDOSULFAN SULFATE	TETRACHLOROETHENE
BUTYL BENZYL PHTHALATE	FLUORANTHENE	TOLUENE
2-BUTANONE	INDENO(1,2,3-CD)PYRENE	TRICHLOROETHENE
BENZO(B)FLUORANTHENE	IRON	TIN
BENZO(GHI)PERYLENE	LEAD	TRANS-1,2-DICHLOROETHENE
BENZO(K)FLUORANTHENE	MAGNESIUM	VANADIUM
BENZO[A]ANTHRACENE	MANGANESE	XYLENE
BENZO[A]PYRENE	MERCURY	ZINC
CHROMIUM		

Groundwater data collected as part of the RI indicated the shallow aquifer was contaminated with organics and inorganics in the areas surrounding the lagoons and landfill, as well as downgradient (north) of the landfill. While not fully characterized during the RI, the deep aquifer was found to be impacted with both organics and inorganics in the area surrounding the landfill and downgradient (north) of the landfill.

Surface soils investigated in and around the landfill as part of the RI were found to contain organic and inorganic COCs. Soils surrounding the nine surface impoundments or lagoons, containing sludges, immediately east of the landfill, were found to contain the COCs in the greatest concentrations relative to the landfill.

3 SITE CHARACTERISTICS

The property west of the Site is used for farming. Undeveloped wetlands are adjacent to the eastern Site boundary and part of the northern Site boundary. There are a number of widely spaced residences along Lake Road, north of the Site, Harris Road, north and west of the Site, and Farrand and Gale Roads, south of the Site. All of these residences have private wells and use groundwater for their water supply.

The closest surface water body to the Site is located north-northeast of the landfill and is referred to as the "Unnamed Lake". The Unnamed Lake was created by damming a creek that flows to the northwest and flooding the upgradient lower-lying area. The lake has a natural inlet to the east, which is connected to a wetland. In the northwest corner of the lake, an outlet (weir) is present in the dam. The outlet of the lake drains into a creek and then into a retention area to the north.

In general, the geology of the Site consists of three low permeability geological units (clays and till) and two higher permeability Class IIA[1] water-bearing units (sand and gravel aquifers). These two water-bearing units are referred to as the Shallow and Deep Aquifers. The shallow aquifer is approximately 25-30 feet below ground surface (bgs) and the deep aquifer is approximately 65-70 feet bgs.

The uppermost Surficial Clay Unit is unsaturated and consists of a discontinuous silty clay and clay layer with a thickness varying from 0 to 20 feet throughout the site.

A Shallow Sand Unit is situated below the Surficial Clay Unit and consists of poorly to well-graded, silty to fine-grained sand. The Shallow Aquifer is within the saturated portion of this Shallow Sand Unit. The thickness ranges from just over 10 feet near piezometer PZ97-3 to over 50 feet at monitoring well MW00-23D. The groundwater flow in the Shallow Aquifer is controlled by the elevation of the underlying Intermediate (confining) Clay Unit, which, in part, determines the saturated thickness of the Shallow Aquifer. The Shallow Aquifer thickness increases south of the Unnamed Lake and extends north and west to Harris Road. This thickness increase roughly corresponds to the area where the highest concentrations of VOCs and 1,4-dioxane have been detected in the Shallow Aquifer. The shallow groundwater generally flows northeast of the landfill until it encounters the unsaturated areas, where it is then confined to a small area between the two unsaturated areas where it begins flowing northwest. Most of the impacted groundwater within the Shallow Aquifer underneath the landfill follows this northeasterly path through this channel in the Intermediate Clay toward the Unnamed Lake, then continues north and west toward Harris Road.

The Intermediate Clay Unit is stiff and consists of impermeable gray till with traces of silt and gravel. The clay surface of this unit generally follows the surface topography sloping to the north of the landfill. The Intermediate Clay Unit varies in thickness, from 1 to over 25 feet. This unit is thin in the area northeast of the landfill and is absent immediately west of the Site. The intermediate clay unit is present beneath the landfill and separates the shallow and deep aquifer. The Intermediate Clay Unit was not encountered directly west of the Site. However, the Intermediate Clay Unit has been documented farther west, separating the Shallow and Deep Aquifers into two distinct units again. The Shallow and Deep Aquifers are hydraulically

[1]Class II groundwaters include all non-Class I groundwater that is currently being used (Class IIA) for drinking water or is potentially available for drinking water or other beneficial use (Class IIB).

connected where the Intermediate Clay is not present, west of Harris Road. In some locations, the groundwater elevations surrounding the landfill are higher (up to 10 feet in the northern area) than those within the Deep Aquifer. This can be indicative that there is potential for groundwater and Contaminants of Concern (COCs) to migrate downward from the Shallow Aquifer into the Deep Aquifer in the area north of the landfill.

The Deep Sand and Gravel Unit consists of fine- to medium-grained sand and gravel. The Deep Aquifer is located within this Deep Sand and Gravel Unit. This unit is absent northeast of the landfill and increases in thickness to over 75 feet thick west of the Site (where the Intermediate Clay Unit is absent). Immediately west, the Deep Aquifer connects with the Shallow Aquifer due to the absence of the Intermediate Clay Unit. Farther west (near Irish Road) the unit is separated into additional layers by the presence of clay lenses.

A Confining Clay Lower Till Unit lies beneath the Deep Aquifer. The Lower Till Unit is a stiff, gray silt and clay with some sand and gravel and overlies the bedrock across the study area. Well logs from nearby residential wells show that the lower till ranges in thickness from 25 to 220 feet. The presence of the Lower Till Unit was verified at all boreholes installed deep enough to intercept the lower till, with the exception of borehole BR19-03, which was installed during the Pre-Design Investigation in 2019. The stratigraphic information collected from bedrock well BR19-03 indicated that there is no Lower Till Unit at this location, meaning that the Deep Aquifer lies directly on top of the bedrock at this location. Where this Lower Till Unit exists, the underlying Bedrock Aquifer, in which most of the residential wells are screened, is protected from contaminant migration. This aquifer is the main source of drinking water in this area.

The Bedrock Aquifer generally flows to the northwest of the landfill. Most of the residential wells are screened in this aquifer, although some are screened in the Deep Aquifer. In general, the Bedrock Aquifer includes interbedded shale and sandstone, and the depth of the bedrock is approximately 200 feet bgs. The FWCC has replaced multiple residential drinking water wells screened in the Deep Aquifer by installing replacement wells in the Bedrock Aquifer, where no impacts have been observed. FWCC also continues to monitor all wells installed in the Bedrock Aquifer.

3.1 NATURE AND EXTENT OF CONTAMINATION

The 1987 RI revealed organic and inorganic contaminants in groundwater in the Shallow and Deep Aquifers extending laterally beyond the footprint of the landfill and lagoons. Landfill and lagoon soils were found to contain organic and inorganic contaminants, including pesticides and PBBs. Lagoon sediments contained oils and sludges from industrial processes.

Initial Site investigations indicated that the predominant groundwater flow direction in the Shallow Aquifer was eastward from the landfill, as well as from the lagoon area, and that several organic and inorganic COCs were detected in concentrations above GWALs but were not migrating off-site at the eastern property boundary above Site cleanup goals. Table 1 presents select organic and inorganic COCs detected above GWALs near the landfill and lagoons.

Table 1: Select Groundwater COCs detected near landfill and lagoons during 1987 RI

COC	Result (ug/L)	GWAL (ug/L)
Aluminum	1,800	300
Manganese	11,000	860
Sodium	994,000	120,000
Zinc	3,740	2,400
Lead	6	4
1,2-Dichloroethane	100	5
Methylene Chloride	38	5
Trichloroethene	11	5
Acetone	2,400	730

Additional monitoring and phased investigations conducted since 1995 to define the migration route and extent of contamination have demonstrated that contaminated groundwater is actually migrating radially towards the northeast and the northwest, with the most heavily impacted groundwater generally flowing from the landfill predominantly to the northeast, between the two unsaturated areas located north and northeast of the landfill (north plume) in the Shallow Aquifer (varying from dry to a 30-foot saturated zone) and west from the landfill in the Deep Aquifer (varying from 32-67 feet thick). Groundwater flow in the Deep Aquifer is generally to the west and northwest with a very flat piezometric surface and a low hydraulic gradient beneath the Site. Off-Site groundwater elevations show that the hydraulic gradient increases in the same west and northwest direction, between Harris Road and Irish Road.

Later investigations conducted from 1999-2004 demonstrated that the north plume contains concentrations of Site contaminants in exceedance of cleanup goals for groundwater in the Shallow Aquifer near the Unnamed Lake, and in both the Shallow and Deep Aquifers at and beyond the property boundary of the 80-acre parcel.

In 2001, because VC and cis 1,2-DCE were detected exceeding the cleanup goals near the Site boundaries and the extent of the VOC contamination had not been fully defined, EPA initiated annual residential well sampling. The residential well sampling program initially included 14 residential wells, which included all homes with the potential to be affected by the contaminated groundwater plume. Based on monitoring well data and residential well data, the residential well program was expanded to include 17 residential wells (Figure 3). To date, 1,4-dioxane is the only VOC detected in any of the 17 residential wells, but at concentrations below the cleanup level. Many of the residential wells previously installed in the Deep Aquifer have been abandoned and replaced by the FWCC with wells installed in the Bedrock Aquifer as a precaution.

FWCC completed a phased investigation for 1,4-dioxane from 2012 to 2016, followed by a Pre-Design Work Plan (AECOM, December 2017) and additional field investigations in 2018. The results from the field investigations were used to evaluate the efficacy of conducting an interim remedy involving a full-scale treatment system for the 1,4-dioxane contamination at the Site. Field investigations included well installation, aquifer testing, and enhanced aquifer modeling. At the same time, samples to evaluate the presence of per- and polyfluoroalkyl substances (PFAS) were collected from 30 on-site and off-site monitoring wells between October 2018 and January 2020. Concentrations of perfluorooctanoic acid (PFOA) from 5 on-site monitoring wells located north of the landfill exceeded the Maximum Contaminant Level (MCL) of 4 nanograms per liter (ng/L). PFAS was not detected in wells northwest of the landfill.

Based on all investigations conducted in OU-2 to date, the Shallow Aquifer has concentrations of both 1,4-dioxane and VC exceeding cleanup goals and migrating past the property boundary, while the Deep Aquifer shows only 1,4-dioxane cleanup goal exceedances migrating past the property boundary. Figures 4 and 5, present the extent of the 1,4-dioxane plumes. While the shallow 1,4-dioxane plume remains generally stable, the concentrations in the deep plume have increased slightly over time. The VC plume has been delineated and includes the area immediately north of the landfill and west of the Unnamed Lake, a shown on Figures 6 and 7. The area of VC impact above the cleanup goal is limited in relation to the 1,4-dioxane plumes and does not appear to be expanding and concentrations are generally decreasing, but natural attenuation rates have not been sufficient to prevent off-site migration.

In 2002 and 2003, pore water samples and surface water samples were collected at the Unnamed Lake to determine if contaminated groundwater was discharging into the lake. All sampling results indicated Site-related COCs were below cleanup goals. An additional fourteen surface water samples collected in August 2002 and lakebed pore water samples collected in February 2003 by EGLE (formerly the Michigan Department of Environmental (MDEQ)) verified these results. A final evaluation of all data conducted by FWCC in 2013 confirmed that contaminated groundwater is not discharging into the Unnamed Lake.

3.2 PRINCIPAL THREAT WASTES

Principal threat wastes at the Site were addressed by the OU-1 lagoons and landfill remedies. There are no known principal threat wastes remaining on-site. However, if principal threat wastes are identified in the future, they will be addressed through the selected remedial action or with a ROD Amendment.

4 SCOPE AND ROLE OF THE ACTION

Because the Site is large and complex, EPA divided the Site into two operable units, or OUs, to address the contamination at the Site. The OUs at the Site at present are the landfill and lagoons: including, liquid wastes, sludge, sediment, and soil, which EPA now considers part of OU-1, and groundwater, which EPA now considers OU-2.

EPA has signed several decision documents at the Site, including the 1984 Initial Remedial Measure (IRM) ROD, the 1986 Lagoons ROD, the 1988 site-wide ROD, the 1993 ESD, and the 2005 site-wide ROD Amendment. The Lagoons ROD required removal, treatment, and off-site disposal of lagoon wastes, and disposal of the excavated sludge, sediment, and soil at a landfill permitted under RCRA. The 1988 ROD, as amended in 2005, required restoration of groundwater to beneficial reuse, removal and off-site treatment of drums and contaminated soil in the landfill, construction of a RCRA cap over the landfill, fencing, and placement of deed restrictions as ICs on the Forest Waste property. Remedies for the lagoons and landfill have been successfully implemented, and no further remedial action is recommended for OU-1. This Proposed Plan describes the recommended alternative for the interim remedy for OU-2 groundwater at the Site.

5 SUMMARY OF SITE RISKS

Prior to the completion of OU-1 remedies, an acute exposure threat existed via direct contact with highly contaminated source material from the landfill and lagoons. Shallow groundwater and lagoon sludge, along with landfill soil and drums were characterized as part of the RI and found to contain high concentrations of lead, chromium, and barium. EPA determined a potential acute exposure threat existed via direct contact with shallow groundwater from the Site.

5.1 Human Health Risk Assessment

A baseline Human Health Risk Assessment (HHRA) and Baseline Ecological Risk Assessment (BERA) were completed as part of the original RI in 1987 to evaluate potential risks to human health and the environment associated with potential exposure to COCs at the Site. 1,4-Dioxane was not a COC at the time of the RI and therefore not evaluated as part of the HHRA. Because remediation of the lagoons was planned under the 1986 ROD, liquids, oil, sludges, and soils associated with the lagoons were excluded from the analysis. The HHRA examined exposure to groundwater, drummed waste, and contaminated soil that remained onsite after the lagoon remediation. Specifically, EPA evaluated current and future exposures to downgradient groundwater users from ingestion of contaminated groundwater through residential use and exposures to trespassers from direct contact with exposed drummed wastes and contaminated soil on-site. The OU1 remedy has addressed the risk identified in the HHRA by removing all drummed waste and associated contaminated soil from the Site.

Currently, human exposure through the drinking water pathway is the only potential risk associated with the impacted groundwater migrating from the landfill. Continued residential use of groundwater is anticipated in the future. The VOCs of primary concern are the VOCs that exceed GWALs at the property boundaries because these VOCs present risk in the event groundwater near the Site boundaries were to be extracted for residential use. VC and 1,4-Dioxane were detected at the property boundary above the EPA's calculated unacceptable human health cancer risk of $1X10^{-4}$,(1.9 ppb) and (46 ppm) respectively.

FWCC conducts an annual groundwater monitoring program, which includes seventeen residential bedrock wells that are sampled and analyzed for VOCs and 1,4-dioxane. 1,4-Dioxane was detected below Michigan's Part 201 Residential Drinking Water Criteria of 7.2 ug/L in five (5) former residential drinking water wells downgradient of the Site. These wells have since been replaced with drinking water wells installed in the unimpacted Bedrock Aquifer as a precaution. The residential wells installed in the bedrock aquifer have not had detections of Site-related COCs other than 1,4-dioxane, which has been detected in some bedrock residential wells at concentrations below the 7.2 ug/L cleanup level. 1,4-Dioxane is the only Site COC that has been detected in residential wells. Michigan's Part 201 Residential Drinking Water Criteria of 7.2 ug/L is calculated using the EPA's "Toxicological Review of 1,4-Dioxane," EPA/635/R-11/003F, September 2013, and Michigan's residential exposure algorithms to protect both children and adults from unsafe levels of the chemical.

Onsite, there are no vapor intrusion receptors present. Offsite, vapor intrusion from groundwater is not anticipated due to the depth of the aquifer, low concentrations of 1,4-dioxane, and low volatility.

5.2 Baseline Ecological Risk Assessment (BERA)

A limited BERA was completed for the Site as part of the 1987 RI to address potential ecological risks to terrestrial and aquatic wildlife. Following an evaluation of the potentially exposed populations, exposure pathways, limited habitat, and affected media, it was determined that a qualitative assessment of ecological risks would be sufficient. Surface water and sediment samples were collected in the wetlands, ponds, and creeks adjacent to the Site. Sampling of biota was limited to the collection of four opossums, three eastern cottontail rabbits, and fish from a residential pond southeast of the Site. After an evaluation of the sampling results, it was determined that the Site posed a very low risk to terrestrial and aquatic wildlife and no further assessment was needed.

5.3 Basis for Action

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Based on the data collected to date and summarized above, the EPA has determined that contaminated groundwater poses unacceptable risks at the Site. Unacceptable groundwater contamination risks are driven by VC and 1,4-dioxane detections above the EPA's acceptable increased cancer risk of $1X10^{-4}$,(1.9 ppb) and (46 ppm) respectively.

6 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are developed as medium-specific goals or objectives for the protection of human health and the environment. RAOs should include the following: the purpose for the action (objective – to prevent, minimize/reduce), relevant COC(s), impacted media, exposure pathways, identified receptors, and a cleanup value. RAOs for the Site were developed based on the following considerations:

- Current and potential future risk
- Applicable or Relevant and Appropriate Requirements (ARARs)
- Discussions with and input from EPA technical experts and Michigan EGLE

The OU-2 interim groundwater remedy is meant to address risks to downgradient receptors in the off-site residential community with residential drinking water wells.

The following are Interim RAOs developed for OU-2 Groundwater:

1. **Prevent the migration of contaminated groundwater with concentrations above drinking water-based cleanup levels for Site-related COCs beyond the Harris Road Site boundary**. This RAO is intended to prevent the off-site migration of groundwater impacted with site-related COCs by implementing one of the response actions presented in this Proposed Plan. The response action will be designed to focus on two areas along Harris Road where contaminated groundwater is known to be migrating off-site.

2. **Prevent residential exposures to groundwater contaminated with vinyl chloride and 1,4-dioxane above drinking water-based cleanup levels.** Monitoring of off-site monitoring wells and residential drinking water wells will be conducted to verify that compliance with the cleanup goals is attained for all locations beyond the Site boundary.

6.1 Remediation Goal Development

Remediation Goals (RGs) represent the cleanup levels for protecting human health and the environment against potential risks posed by exposure to COCs at a Site. RGs are typically developed based on chemical-specific ARARs, when available, or Site-specific, risk-related factors (i.e., the baseline risk assessment). The interim remedial action described in this Proposed Plan is meant to address VC and 1,4-dioxane in Site groundwater and to prevent further off-property migration of the contaminated plume. Complete capture of the affected groundwater will be monitored through a network of wells used to measure and evaluate groundwater levels.

When an Interim remedial action, such as this one, is proposed, compliance with ARARs may be waived until the Final ROD. A final groundwater remedy for VC and 1,4-dioxane will select the cleanup goal. However, to provide a goal to evaluate drinking water-based cleanup levels for this remedial decision for groundwater, two ARARs were used to determine Remedial Goals

(RG) for both contaminants of concern: the federal Maximum Contaminant Level (MCL) under the Clean Water Act for drinking water and the Michigan Part 201 Residential Drinking Water Criteria for 1,4-dioxane. The RG for VC is 2 µg/L, which is the MCL for drinking water. There is no federal drinking water standard for 1,4-dioxane, but the Michigan Part 201 Residential Drinking Water Criteria (RDWC) for 1,4-dioxane is 7.2 µg/L. This promulgated state standard serves as an ARAR for 1,4-dioxane in drinking water and therefore the RG for 1,4-dioxane is 7.2 µg/L for the interim remedial action recommended in this Proposed Plan. As such, although not required, ARARs for groundwater cleanup levels will be met by this interim action.

7 SUMMARY OF REMEDIAL ALTERNATIVES

After an initial screening of remedial alternatives, the most appropriate technologies for further consideration were assembled into a range of potentially viable remedial action alternatives for OU-2 groundwater. These remedial alternatives were developed by the FWCC with oversight from the EPA and EGLE. Based on a focused screening of technology/process options for addressing Site COCs while considering effectiveness, implementability, and cost, the following three alternatives were evaluated for application at the Site.

Remedial Alternative	Description
1	No Further Action
2	Groundwater Extraction and Ex-situ Treatment
3	Permeable Reactive Barrier (PRB) using In-Situ Oxidation Using Ozone and Hydrogen Peroxide

7.1 Alternative 1: No Further Action

In accordance with requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), EPA is required to evaluate a “no action” alternative when considering potential remedial actions for a site. The No Action alternative is identified and carried through the evaluation process as a point of comparison for the other alternatives. This alternative is evaluated to determine the risks to human health and the environment if no additional actions are taken to remediate groundwater contamination. Under this alternative, there would be no remediation beyond the actions that have been completed to date. In addition, under Alternative 1, existing ICs selected and implemented pursuant to the 1988 site-wide ROD, which include access restrictions, Genesee County Health Department restrictions on installation of new water supply wells, and special well construction techniques, would remain in place. These ICs were reviewed by EPA during the 2022 Site Five-Year Review, and they were found adequate to protect human health and the environment. However, with this alternative no new active steps would be taken to reduce or prevent migration of the contaminant plume(s) or to reduce concentrations beyond the Site boundary.

7.2 Alternative 2: Groundwater Extraction and Ex-situ Treatment

Alternative 2 involves the capture, extraction, and above-ground treatment of groundwater impacted with 1,4-dioxane and VC. Impacted groundwater would be extracted from both Shallow and Deep Aquifer vertical recovery wells screened to coincide with the optimum capture efficiency predicted by groundwater modelling results. Twelve Shallow aquifer wells would be installed on-site near Harris Road and designed to pump an average of 15 gallons per minute (gpm) per well. In addition, three Deep Aquifer wells would be installed along Harris Road, and existing deep well ATW19-2D would be converted to a recovery well, for a total of four Deep Aquifer extraction wells. These wells would have a screen length of 25 feet and achieve an estimated yield of 35 gpm from each well. All new Shallow and Deep Aquifer extraction wells would be expected to have a minimum diameter of six inches and would be constructed from polyvinyl chloride (PVC). Electric submersible pumps installed in the wells would pump groundwater from the extraction wells to high-density polyethylene (HDPE) recovery piping installed beneath the historical subsurface frost line. The HDPE piping will convey groundwater from the respective extraction wells to the ex-situ treatment system. Each electric submersible pump would be controlled by a variable frequency drive and pressure transducer to achieve accurate groundwater level control in each extraction well. The same piping trenches used for groundwater extraction will be used for electrical and communication conduits to enable operation and control of the submersible pumps from the ex-situ treatment building. The extraction system would be designed to achieve a total flowrate from the combined Shallow and Deep Aquifer wells of 300 to 350 gpm, based on the capture model. The actual flowrate may vary due to subsurface conditions encountered during installation of the extraction wells. A figure showing the conceptual locations of extraction wells, a treatment system enclosure, and a surface water discharge location are provided on Figure 8. A conceptual design of the groundwater extraction system is included on Figure 9. This conceptual design may be modified based on additional remedial design studies.

Alternative 2 also includes installation of new monitoring wells to monitor the performance of the remedy. An estimated total of ten Shallow and five Deep Aquifer monitoring wells will be installed to supplement the existing monitoring well network. These supplemental wells will be advanced using sonic drilling methods to approximately 50 feet bgs and 100 feet bgs, respectively. The ex-situ treatment system will be housed in a steel prefabricated building installed on the property of the former Forest Waste Landfill. The ex-situ treatment system would be designed to accommodate an estimated maximum influent groundwater flowrate of 400 gpm. Unit processes incorporated into the ex-situ groundwater treatment system include chemical oxidation, activated carbon adsorption and treated groundwater discharge to the Unnamed Lake, or another surface water body if needed as an alternative. The groundwater discharge exiting the ex-situ treatment system must comply with the approved Substantive Requirements Document (SRD) issued by EGLE on October 28, 2021. The Unnamed Lake is the nearest surface water body and would be the logical choice for discharge of the treated groundwater. The next likely choice for surface water discharge would be Butternut Creek near Farrand Road.

Chemical oxidation would be used to destroy 1,4-dioxane in the extracted groundwater. An Advanced Oxidation Process (AOP) is proposed for Alternative 2 and would be appropriate for the destruction of 1,4-dioxane and VC. AOPs are the only fully demonstrated technology available for 1,4-dioxane treatment in drinking water and groundwater, achieving over 97% removal. AOP agents used in this ex-situ treatment system would include ozone and hydrogen peroxide injected into a plug flow reactor housed in the building. Liquid-phase activated carbon could also be used to remove VC, PFAS, and/or hydrogen peroxide from extracted groundwater. Following degasification in a vessel, extracted groundwater would be treated in two vessels of activated carbon piped in a series arrangement.

Alternative 2 – Groundwater Extraction and Ex-situ Treatment is estimated to cost $24.3 million, including capital/installation costs and annual operation and maintenance (O&M) costs up to 30 years. A net present value (NPV), which incorporates a discount factor of 7%, was calculated for a treatment period of 30 years[2], and the NPV is $14.9 million. Capital costs would include construction of the extraction wells, installation of additional monitoring wells, construction of the conveyance piping and treatment building, and the installation of treatment components, controls, and electrical.

Treatment and O&M	Estimated Cost	Calculated Net Present Value
Design + Construction	$8,208,834	$8,208,834
Annual O&M 30 Yrs	$16,140,000	$6,676,064
TOTALS	**$24,348,834**	**$14,884,899**

7.3 Alternative 3: Permeable Reactive Barrier (PRB) using In-Situ Oxidation Using Ozone and Hydrogen Peroxide

Under Alternative 3, groundwater would be treated in place underground using specialized injection wells to continuously inject ozone and hydrogen peroxide, which would create a permeable reactive barrier (PRB). As the shallow and deep groundwater plumes migrate through the PRB, the ozone and hydrogen peroxide would react with and destroy the contaminants upon contact. Impacted groundwater would be treated in-situ, with no need for extraction or discharge of treated water. Based on groundwater modeling and the approximate width of the plume at Harris Road, a minimum of 60 wells would be advanced to target the Shallow Aquifer between 15 and 40 feet bgs. The wells would be evenly distributed across the 1,200-foot wide shallow 1,4-dioxane plume, creating an on-site PRB along Harris Road. To target the Deep Aquifer, a minimum of 25 wells would be advanced approximately 60 to 105

[2] 30 Years based on 1988 EPA Interim Final Guidance for Conducting Remedial investigations and Feasibility Studies Under CERCLA

feet bgs. The wells would be evenly distributed across the 500-foot wide deep 1,4-dioxane plume, creating an additional on-site PRB along Harris Road.

An estimated cost for Alternative 3 – PRB Using In-situ Oxidation and Hydrogen Peroxide includes capital costs and O&M of the in-situ system. Similar to Alternative 2, a NPV, which incorporates a discount factor of 7%, was calculated for a treatment period of 30 years. The estimated capital cost assumes the construction of the two in-situ PRBs along Harris Road for the 1,200-foot wide Shallow Aquifer plume and the 500-foot wide Deep Aquifer plume.

Treatment and O&M	Estimated Cost	Calculated Net Present Value
Design + Construction	$8,431,217	$8,431,217
Annual O&M 30 Yrs	$16,170,840	$6,688,821
TOTALS	**$24,602,057**	**$15,120,038**

8 EVALUATION OF ALTERNATIVES

8.1 Evaluation Criteria

According to the NCP, nine criteria are used to evaluate the remediation alternatives, individually and in comparison to each other, in order to select a remedy. The nine criteria can be subdivided into three categories: threshold criteria, primary balancing criteria, and modifying criteria.

These threshold criteria must be met for a remedial alternative to be eligible for selection:

(1) **Overall Protection of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to human health and the environment through institutional controls, engineering controls, or treatment.
(2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the Site, or whether a waiver is justified.

The primary balancing criteria, technical criteria used as the basis for the detailed analysis, are:

(3) **Long-term Effectiveness and Permanence** considers the ability of an alternative to achieve and maintain long-term, effective, and permanent protection of human health and the environment over time.

(4) **Reduction of Toxicity, Mobility, or Volume Through Treatment** evaluates an alternative's use of treatment to reduce harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
(5) **Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
(6) **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
(7) **Cost** includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth costs are the total costs of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

The modifying criteria (State and community acceptance) are assessed formally after the public comment period:

(8) **State/Support Agency Acceptance** considers whether the State agrees with the EPA's analysis and recommendation, as described in the Remedial Investigation/Feasibility Study (RI/FS) and Proposed Plan. For each alternative the State/Support Agency acceptance of the preferred alternative will be evaluated after EPA receives comments on the Proposed Plan from the state agency.
(9) **Community Acceptance** considers whether the local community agrees with EPA's analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD for the Site.

8.2 Comparative Analysis of Alternatives

This section compares the three remedial alternatives for OU-2 groundwater described in Section 7, above, using seven of the nine evaluation criteria discussed in Section 8.1. The results of this analysis are used to compare relative advantages and disadvantages of the alternatives, consistent with EPA guidance (1988; 2005). Similar to the detailed analysis provided in the FS, the following discussion is presented in accordance with the seven evaluation criteria.

8.2.1 Protection of Human Health and the Environment

The Site-specific RAOs developed to protect human health and the environment are as follows:

- RAO #1 - Prevent the migration of contaminated groundwater with concentrations above drinking water-based cleanup levels beyond the Harris Road Site boundary.

- RAO #2 - Prevent residential exposures to groundwater contaminated with vinyl chloride and 1,4-dioxane above drinking water-based cleanup levels.

Alternative 1 would not be protective because no remedial effort other than the existing ICs would be made to protect potential receptors who have the potential to be impacted by the future migration of contaminated groundwater. Alternative 2 would be protective because it would hydraulically control and reduce the migration of the plumes beyond Harris Road, thus protecting potential off-site receptors from future migration of contaminated groundwater. The extracted water would be treated aboveground, such that the discharged water would have no adverse effect on sensitive receptors. Alternative 3 also would be protective because it would destroy the contaminants as the plume passes through a treatment zone; however, the effectiveness would depend on the contact time between the oxidants and the contaminants and may be undermined by the high seepage velocity and presence of anaerobic conditions. Alternative 2 provides the highest protection to sensitive receptors.

8.2.2 Compliance with ARARs

Alternative 1 would not meet Applicable or Relevant and Appropriate Requirements (ARARs) because it does not affect plume migration or reduce mass loading of COCs to off-site areas. Alternative 2 complies with the ARARs because it would reduce the migration of the shallow and deep plumes beyond Harris Road, thus protecting potential off-site receptors from future migration and continued mass loading, and it would remove contaminants before discharge of treated water. Alternative 3 would also comply with ARARs because contaminants would be destroyed as the plumes pass through the PRBs. Alternatives 2 and 3 provide an equal degree of compliance with ARARs.

8.2.3 Long-Term Effectiveness

This criterion includes evaluating the long-term effectiveness and permanence of the cleanup alternatives following implementation, along with the degree of certainty that the alternatives will be successful. This criterion specifically addresses the magnitude of residual risks and the long-term adequacy and reliability of the alternative.

Alternative 1 would not be effective in the long term because no active remediation would be implemented and the contaminant plume would continue to migrate, potentially contaminating residential drinking water wells. Alternative 2 would be effective in the long term because it would hydraulically control and reduce the migration of the plumes beyond Harris Road, as well as remove the contaminants in the treated water before discharge. Alternative 3 would also be effective in the long term because it would remain in place while contaminant concentrations remain greater than the cleanup levels. There are no residual risks associated with Alternatives 2 or 3. However, the effectiveness of Alternative 3 would depend on the contact time between the oxidants and the contaminants and could be undermined by the high seepage velocity, as well as presence of anaerobic conditions in the groundwater emanating from the former landfill. Based on this, Alternative 2 is anticipated to provide the greatest degree of long-term effectiveness.

8.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 1 would not meet this criterion because there is no active treatment associated with this alternative. Alternative 2 would meet this criterion because it would extract and treat contaminated groundwater, thus reducing plume mobility through extraction. It would also reduce the toxicity and volume of the contamination through treatment. Alternative 3 would meet this criterion because it would reduce the toxicity and volume of contamination through treatment, although it would not affect plume mobility.

8.2.5 Short-Term Effectiveness

Short-term effectiveness includes evaluating the following elements during the implementation of each alternative: impacts to the environment, the local community, and to Site workers. Alternative 1 would not create any short-term impacts or pose any construction burden on neighboring property owners, but it also would not achieve any environmental benefit. Alternative 1 poses no risk to Site workers. Alternative 2 would be effective in the short term because it is designed to meet the RAOs following start-up of the system and will have little negative environmental impact. Alternative 3 is also designed to effectively destroy contaminants and meet the RAOs following start-up, though it would not affect plume mobility nor provide hydraulic control. Both Alternatives 2 and 3 would require extensive construction activities that may temporarily affect the neighboring property owners and construction workers. Design and construction activities for both Alternatives are estimated to take 2 years, however onsite construction is not anticipated to take place that entire time. Construction activities associated with Alternative 2 would include construction of a single treatment building, whereas the mechanical systems associated with Alternative 3 would consist of multiple trailer-mounted units which would be more mobile. While Alternative 3 may pose slightly less short-term construction impact on neighboring communities and construction workers, it would not be as effective in the short-term for hydraulic control of impacted plumes.

8.2.6 Implementability

Implementability considers the ease or difficulty of implementing an alternative, including technical feasibility, administrative feasibility, and availability of required services and materials. Alternative 1 is the most easily implemented, since it involves no materials or active construction. However, it does not meet the RAOs. Alternative 2 has uncertainties associated with discharge limits that may require design changes and could affect schedule. The systems of Alternative 3 would be provided as turnkey units, and injection wells, though numerous, would be relatively easy to implement. Alternative 3 would be slightly easier to implement than Alternative 2.

8.2.7 Cost

Alternative 1 would be the lowest-cost alternative because it does not involve any active remediation.

Estimated overall costs for Alternatives 2 and 3 are very similar, $24.3 million and $24.6 million respectively, including the estimates for design, material, construction and operation.

8.2.8 State / Support Agency Acceptance

This criterion evaluates whether the support agency, based on comments submitted after its review of the draft Proposed Plan, concurs with, opposes, or has no comment on EPA's preferred alternatives. EGLE has indicated support for selection of Alternative 2 - Groundwater Extraction and Ex-situ Treatment.

8.2.9 Community Acceptance

This criterion refers to the information relayed to the Agencies by the community regarding the Proposed Plan comment period. This criterion will be evaluated based on any comments submitted during the public comment period on the Proposed Plan and will be described in the Responsiveness Summary section of the ROD Amendment.

EPA's Preferred Alternative

Based on the detailed and comparative evaluations of alternatives in Section 8, Alternative 2 - Groundwater Extraction and Ex-situ Treatment, provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria and is, therefore, EPA's Preferred Interim Alternative for the Site's OU-2 Groundwater. Based on the information available at this time, EPA believes that the Preferred Alternative would be protective of human health and the environment,, be cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Five-year reviews will continue to be conducted and will include the selected interim remedy to ensure it is protective of human health and the environment.

9 Community Participation

Site information can be found on EPA Region 5's website at: https://www.epa.gov/superfund/forest-waste-products. Announcements may also appear on Twitter and Facebook @EPAGreatLakes. A display ad will also be published in The Flint Journal.

EPA provides information to the community by maintaining an information repository and AR file for this site. Through these means, EPA encourages the public to gain a more comprehensive understanding of the Superfund activities that have been conducted.

Documents used to develop the proposed cleanup plan are available online and at the following locations:

Forest Township Office, 130 East Main St., Otisville, Michigan, 48463

EPA Region 5, 7th Floor Records Center, 77 W. Jackson Blvd, Chicago, IL, 60604

EPA will accept written comments from May 11 to June 10. Written comments can be submitted online and via postal mail to:

Lina Wu
Community Involvement Coordinator
U.S. EPA Region V
77 W. Jackson Blvd.
Chicago, IL 60604

10 Figures

List of Figures:

References

REM IV, 1987. Remedial Investigation Report – Forest Waste Disposal Site, Otisville, MI

GHD, 2020. Pre-Design Investigation Report – Forest Waste Disposal Site, Otisville, MI

AECOM, 2017. Pre-Design Workplan - Forest Waste Disposal Site, Otisville, MI

GHD, 2018. PFAS Initial Screening - Forest Waste Disposal Site, Otisville, MI

US EPA, 1998. Superfund Record of Decision - Forest Waste Disposal, Otisville, MI

REM IV, 1988. Design Analysis Report - Forest Waste Disposal, Otisville, MI

US EPA, 2005. Record of Decision Amendment - Forest Waste Disposal, Otisville, MI

US EPA, 2022. Sixth Five Year Review Report - Forest Waste Disposal, Otisville, MI