Proposed Plan for Groundwater Cleanup
Copley Square Plaza Site
Operable Unit 2
Summit County, Ohio

Community Participation

EPA and Ohio EPA provide information regarding the Copley Square Plaza Superfund site to the community by holding public meetings, maintaining an Administrative Record for the site, and publishing announcements in the *Akron Beacon Journal.* Through these means, EPA and Ohio EPA encourage the public to gain a more comprehensive understanding of the Superfund activities that have been conducted at the site. Site information can also be found on EPA Region 5's web site at http://www.epa.gov/Region5/cleanup/copleysquare.

EPA maintains the site Administrative Record, which contains the information EPA used to develop the proposed site remedy, at the following locations:

Fairlawn-Bath Library 3101 Smith Road Akron, Ohio Hours: 10AM – 6PM (330) 666-4888	U.S. EPA Region 5 7th Floor Records Center Chicago, Illinois M-F 8AM to 4PM

EPA will be accepting written comments on the Copley Square Plaza site Proposed Plan during the public comment period, which **will run for a total of thirty (30) days from July 6 through August 5.** Written comments may be sent to the following address:

Susan Pastor
Community Involvement Coordinator
U.S. Environmental Protection Agency
Mail Code SI-7J
77 W. Jackson Blvd. Chicago, IL 60604

I. Introduction

The U.S. Environmental Protection Agency (EPA), in consultation with the Ohio Environmental Protection Agency (Ohio EPA), is issuing this Proposed Plan to present its preferred cleanup alternative for addressing the groundwater contaminant plume in the intermediate and deep groundwater aquifers at the Copley Square Plaza (Copley) Superfund site in Copley Township, Summit County, Ohio. EPA refers to the intermediate and deep aquifers as "operable unit 2" (OU2) of the Copley site.

EPA recommends that **Alternative 2**: In-situ Chemical Reduction, be implemented at the Copley site to address the volatile organic compound (VOC) contaminants found in the intermediate and deep groundwater aquifers. EPA would also monitor groundwater quality over time to measure the success of the remedy in achieving cleanup goals and use institutional controls (ICs) to restrict the use of the groundwater until cleanup levels are reached. The estimated total cost of the proposed cleanup alternative is $4,863,640. It would take about 3 months to inject the chemical reducing agent into the deeper groundwater aquifers and then an estimated 2-5 years after the final injection until cleanup levels are met.

EPA will explain the rationale for proposing the preferred alternative in this document, as well as describing all the alternatives that were evaluated to address OU2. This document also describes site history, including previous investigations and response actions performed.

EPA, as the lead agency for the Copley site, is issuing this Proposed Plan as part of its public participation responsibilities under Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C Section 9617, commonly known as Superfund, and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Ohio EPA is providing support. This Proposed Plan summarizes information from the site Remedial Investigation (RI) and Feasibility Study (FS) reports and other documents that comprise the site Administrative Record (AR). EPA encourages the public to review the AR to gain a more comprehensive understanding of the cleanup and investigative activities that have been conducted at the site.

EPA, in consultation with Ohio EPA, will select a remedy to cleanup OU2 in a document called the Record of Decision (ROD) after reviewing and considering all information submitted during a 30-day public comment period. The ROD will include a Responsiveness Summary that summarizes EPA's responses to public comments on this Proposed Plan. EPA may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the alternatives presented in this Proposed Plan. Members of the public may also request that EPA hold a public meeting to present the alternatives evaluated in this proposed plan. Interested parties are encouraged to request a public meeting no later than Friday, July 17. If a meeting is scheduled, EPA will notify local residents.

This would be the final remedial action proposed for the Copley site. EPA has already initiated cleanup measures for OU1, which is comprised of the contaminant source area and the VOC contaminant plume in the shallow groundwater aquifer. The shallow aquifer was injected with a chemical reducing agent paired with microorganisms and substrate (nutrients and an electron acceptor or energy source ("food")) in order to treat the groundwater contaminants. Quarterly monitoring is being conducted to track cleanup progress and to provide data for determining if a second application is necessary. EPA also connected 26 residences to the Akron municipal water supply and installed sub-slab depressurization systems in 8 residences to help prevent potential vapor intrusion hazards.

II. Site Background

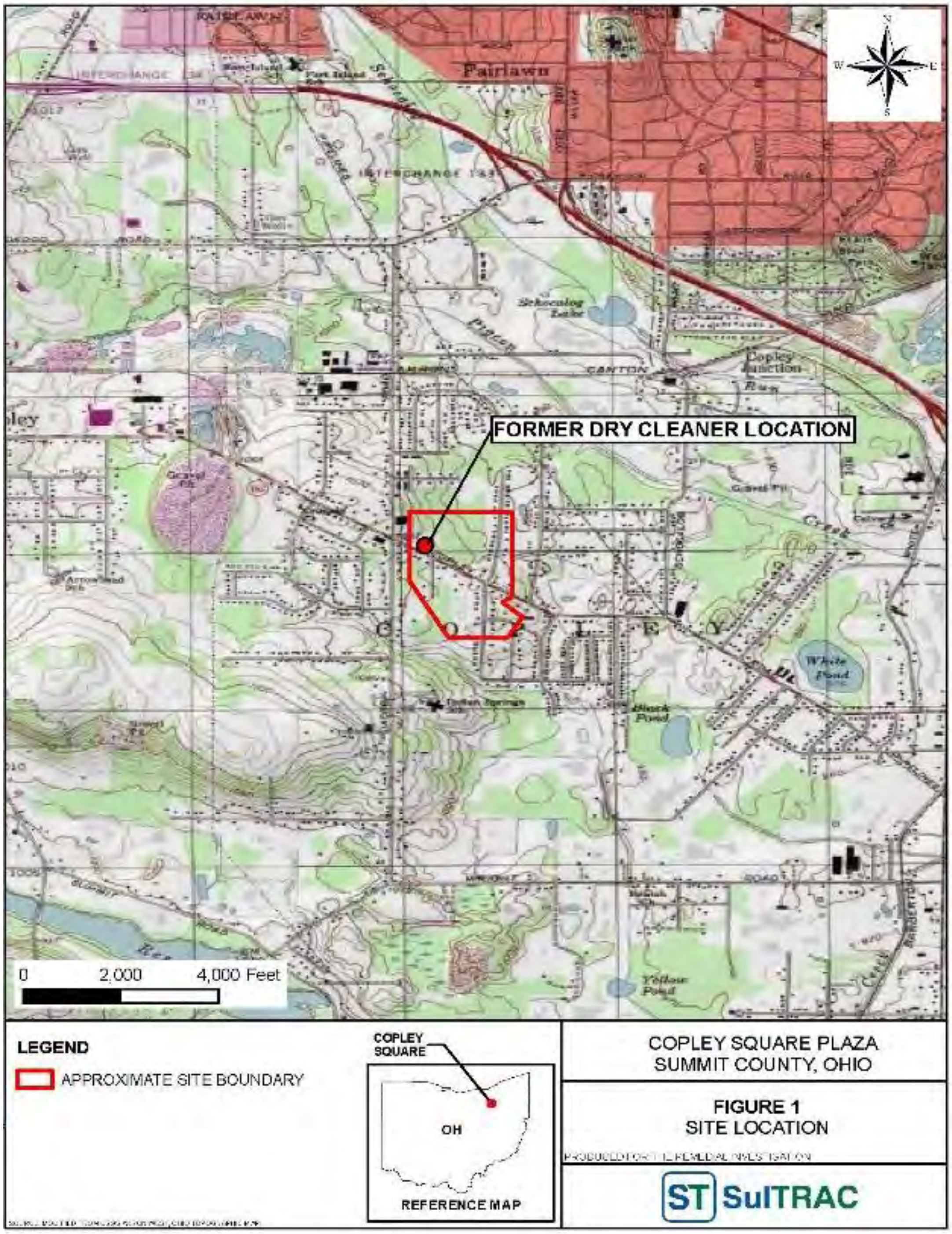
A. Site Description

The Copley site is located at 2777 and 2799 Copley Road in Copley Township (see Figure 1, next page). The site spans approximately 86 acres, and includes the Copley Square Plaza retail complex and the area above the shallow, intermediate, and deep groundwater contaminant plumes (see Figure 2 on page 4). Copley Square Plaza includes two buildings and the western and southern parking areas shared by the two buildings. A small building (2777) to the south housed the Danton Dry Cleaners (DDC) facility, which was the source of the VOC contamination in the groundwater. This building is presently occupied by a dental office, a barber shop, a youth dance studio, and the former DDC space. A large building (2799) to the north currently houses an auto parts store, and was formerly Knight's Hall and a brewery.

The surrounding area is both commercial and residential. Copley Square Plaza is bordered to the north by a vacant lot and a condominium complex, to the east by undeveloped land and a condominium development property, to the south by Copley Road and a residential area, and to the west by commercial businesses and a residential area (see Figure 2 on page 4). As seen in

Figure 2, the groundwater contaminant plume extends south-southeast from Copley Square Plaza towards a mostly residential area.

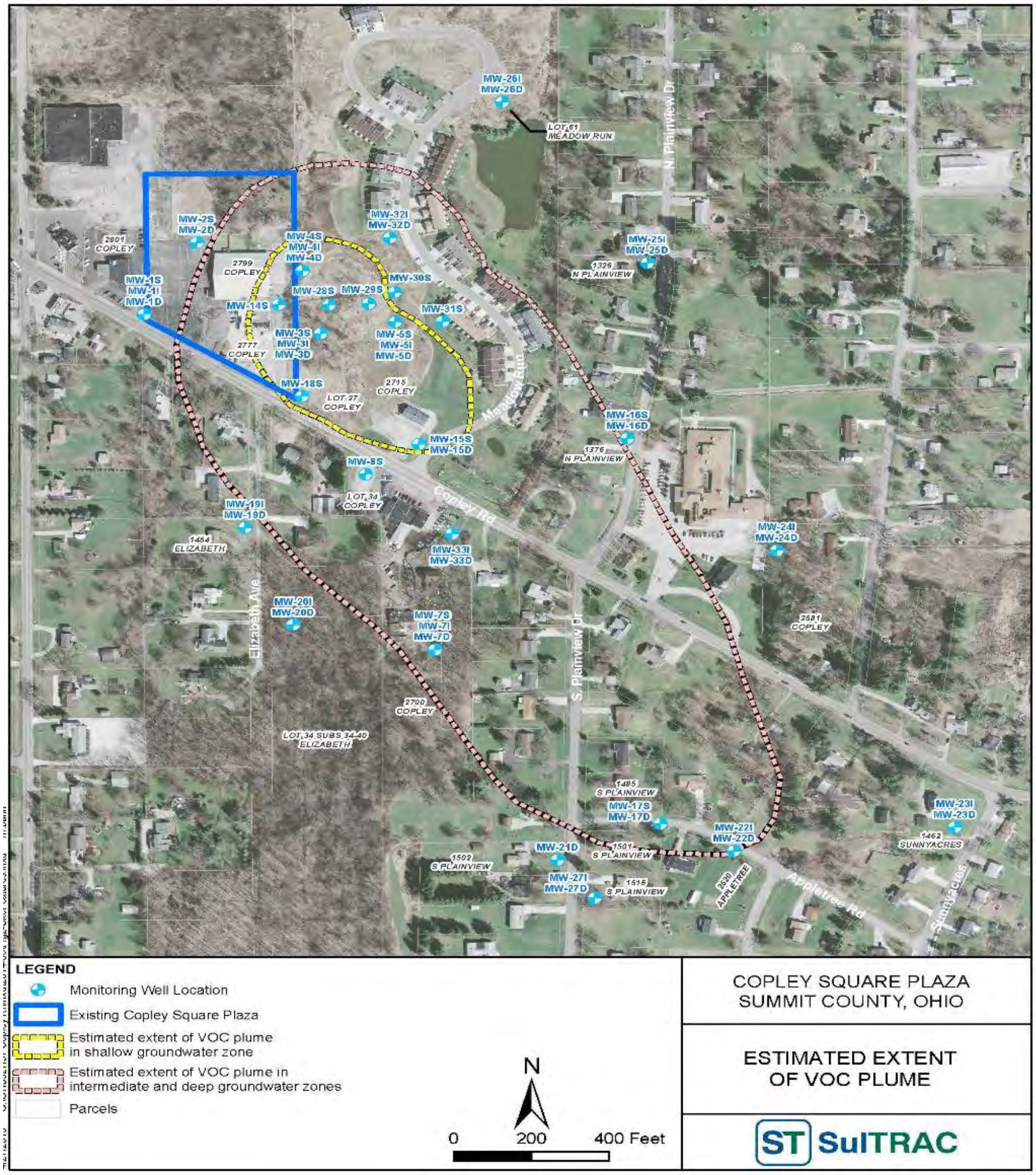
Figure 1: Site location



B. Demographics and Land Use

Summit County consists of about 413 square miles of land and 7.3 square miles of surface water features. The population of Summit County is 541,781 (U.S. Census Bureau 2010). Land use in the county is about 52 percent urban, including residential, commercial, industrial transportation, and urban grassland uses. Forest and croplands are the other major land uses. In the site area, the approximate population of Copley Township is 37,304. Median age is 40 years and the population is predominantly white/non-Hispanic (about 80 percent).

Figure 2: Site area features and extent of groundwater contaminant plumes



C. Site History and Initial Response Actions

Before the Copley Square Plaza complex was developed in the late 1950s, the property was an operating cattle farm. The building at 2777 Copley Road was built in 1963, and the building at 2799 Copley Road was built in 1965. The 2777 building housed a number of dry cleaning businesses from the 1960s until August 1994. The most recent was Danton Dry Cleaners.

Ohio EPA received a complaint of an odor in the water supply at Copley Square Plaza in April 1990 and in response initiated sampling of two private groundwater production wells immediately east of the 2777 building. Sample results from these private wells indicated the presence of the VOCs perchloroethylene (PCE), trichloroethylene (TCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and vinyl chloride at concentrations above federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs). As a result, Ohio EPA directed the tenants to cease using the private wells, which were then taken out of service. From 1991 to 1993, after the affected wells had been decommissioned, Ohio EPA continued its investigations by sampling surrounding wells, but results indicated no contamination attributable to the site.

Further investigations by Ohio EPA in April 1994 revealed that wastewater containing VOCs was present in concrete pits beneath the floor of the 2777 building. Ohio EPA conducted a dye tracer test, which showed that the VOC-contaminated wastewater flowed into area surface water and groundwater. Subsequently, Ohio EPA sampled nearby residential wells and discovered that nine wells contained VOC concentrations above MCLs. Ohio EPA then requested assistance from EPA.

In August 1994, EPA initiated a removal action to address the immediate health threats posed to local residents due to the VOC contamination in their wells and installed six point of entry household water treatment systems designed to remove the contaminants from the well water before use. EPA also closed the eight wastewater tanks at the dry cleaning facility at Copley Square Plaza and installed a shallow groundwater recovery trench and sump system at the dry cleaning building to help prevent further release of VOC contamination into the groundwater. After completion of the EPA removal action in 1995 until the connection to Akron municipal water in 2012, Ohio EPA operated, maintained, and tested the household water treatment systems and the groundwater recovery system at the site.

In January 2002, Ohio EPA recommended to EPA that a Superfund site inspection (SI) be completed at the Copley site to determine if an ongoing release of contamination to groundwater was occurring. Ohio EPA completed the SI in September 2002 and then an expanded SI (ESI) in August 2003. Based on the results of the SI and ESI, EPA placed the Copley site on the National Priorities List (NPL) in April 2005.

EPA later divided the Copley site into two OUs for ease of addressing the contamination. OU1 includes site soil, shallow groundwater, and soil vapor intrusion (VI) issues associated with the shallow groundwater contaminant plume. VI is the process in which VOCs in shallow groundwater become a gas (vapor) and enter (intrude) a building through its foundation or basement to be potentially inhaled by its occupants. OU2, the subject of this Proposed Plan, addresses the VOC contamination in the intermediate and deep groundwater aquifers.

After completing a remedial investigation (RI) and a feasibility study (FS) for OU1, EPA issued a ROD on October 13, 2009 documenting selection of a cleanup remedy for OU1. The selected remedy consisted of treating the soil and shallow groundwater using chemical reducing compounds, providing residences that have contaminated well water with access to a public water supply, and installing VI mitigation systems in selected residences that had potential VI issues.

After completing the OU1 remedial design, EPA installed sub-slab depressurization systems in eight private residences to prevent VI; hooked up 26 residences to the Akron municipal water supply and abandoned the 26 private wells; and implemented one round of in-situ chemical reduction (ISCR) with bio-augmentation in the soil and shallow groundwater. ISCR consists of injecting chemical reducing agents and microorganisms into the ground and groundwater that serve to break down VOC contaminants in these media. EPA is now monitoring shallow groundwater quality to evaluate the efficacy of the ISCR and will determine in fall 2015 if a second round is needed to optimize the breakdown of VOCs in the shallow groundwater.

EPA completed a RI and FS for OU2 in May 2015.

III. Site Characterization

A. Contaminants of Concern

EPA has identified the VOCs vinyl chloride, PCE, TCE, and *cis*-1,2-DCE as contaminants of concern (COCs) in OU2 at the Copley site. Both TCE and PCE are colorless liquids typically used in industrial processes as solvents to clean metal parts. PCE is used for dry cleaning. PCE, TCE, and their breakdown products (vinyl chloride, *cis*-1,2-DCE) can pose potential health risks through eating contaminated soil or drinking contaminated water, through direct contact, or through breathing contaminated air. Short-term exposure to high levels of these VOCs may lead to headaches, lung irritation, dizziness, unconsciousness, and death. Long-term, low level exposure could cause carcinogenic (cancer-causing) and/or non-carcinogenic health effects. These compounds are being designated as COCs because they are persistent and present in the site groundwater aquifers at concentrations above MCLs and/or health-based levels.

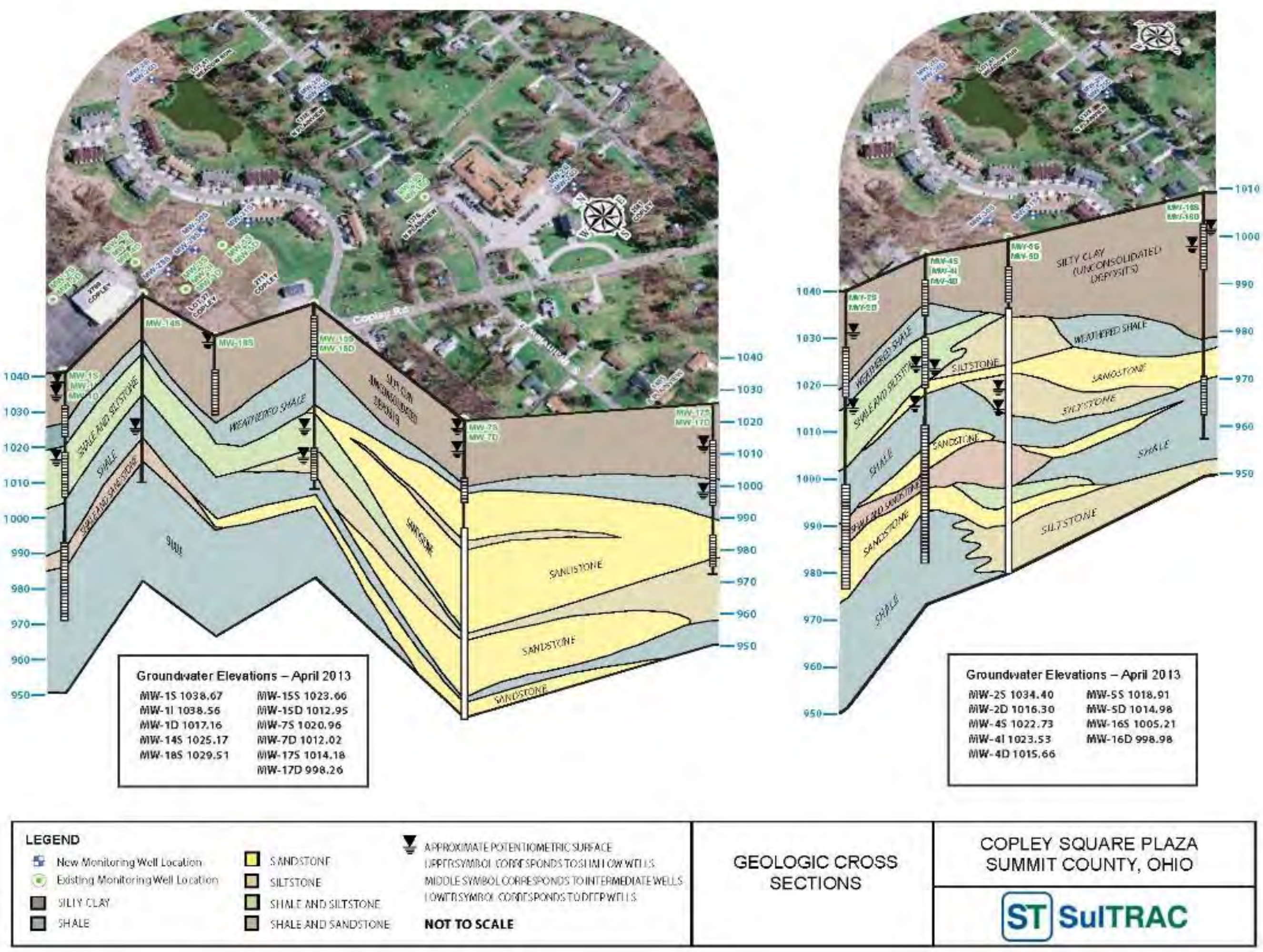
B. Site Geology

The site geology can be divided into two main categories: unconsolidated glacial deposits (till) and underlying bedrock. The underlying bedrock can be further categorized into the intermediate bedrock and the deep bedrock zones, which are the focus of OU2. Figure 3 (next page) presents two geologic cross-sections based on boring logs from select monitoring wells installed during past investigations. As seen in Figure 3, the glacial till overlying the bedrock in the area is about 10 to 20 feet thick and generally consists of interbedded silt, sand, clay, and gravel. Within the till deposits are thin sand layers that range in composition from fine, silty sand to clean fine and medium sands. These interbedded sands range in thickness from less than 1 foot to about 5 feet. Shale fragments are typically present within the till directly above the bedrock surface.

The bedrock underlying the glacial till is the Cuyahoga Group of interbedded and interfingering shales, sandstones, and siltstones. The shales are thinly bedded with horizontal and vertical fracturing, which provides hydraulic interconnection among the various rock layers. Based on site-specific boring logs as well as private water well logs, the top of bedrock is encountered between 10 and 19 feet below ground surface (bgs) in the site vicinity. Farther to the east and northeast, along North Plainview Road, bedrock is encountered from 23 to 65 feet bgs. Bedrock is encountered from 20 to 36 feet bgs in the area of South Plainview, Appletree, and Greening Roads.

The shallow bedrock is weathered and is about 5 to 7 feet thick at a depth of about 13 to 20 feet bgs. The bedrock becomes less fractured and more competent at depths of approximately 30 to 33 feet bgs.

Figure 3: Geologic cross-sections



The intermediate bedrock zone is the area of fractured rock typically encountered between the weathered bedrock zone and deeper, more competent bedrock. The intermediate bedrock is composed of a gray fissile to fossiliferous shale with interbedded layers of micaceous siltstone and very fine sandstone. Each lithology varies in thickness from less than 1 foot to about 6 feet. Vertical and subvertical fracturing with ferric oxidation and some mineralization was noted throughout this zone. In borings, the fractures were wet and, in some zones, were filled with saturated silt or clay material.

The deep bedrock zone is the area of competent rock encountered beneath the weathered and fractured intermediate bedrock. The boundary between the deep bedrock zone and the intermediate bedrock zone is indistinct and cannot be identified based on the extent of fracturing.

However, past geotechnical boring logs have indicated that fracturing within the bedrock ends at a distinct and definitive lithological contact. Fracturing readily occurs in upper bedrock lithological units composed primarily of shale with thin interbedded sandstone. Conversely, the deep bedrock unit is composed of sandstone with interbedded shale; this unit is more competent and less likely to fracture.

C. Site Hydrogeology

The site area is characterized by three groundwater zones. The shallow groundwater zone is potentially a perched water table within the silty clay till unit overlying the bedrock and is about 10 to 20 feet thick. The till layer generally consists of interbedded silt, sand, clay, and gravel lens. The interbedded sands range in thickness from less than 1 foot to about 5 feet. A discontinuous sandy gravel layer is present southeast of the 2777 building at a depth of approximately 10 feet bgs, and a discontinuous silty sand layer is present directly beneath the building. Shale fragments are typically present within the till directly above the bedrock surface. Shales are thinly bedded with vertical fracturing, which provides hydraulic interconnection.

An intermediate groundwater zone exists within the relatively higher fractured portion of the bedrock. Monitoring wells were installed within the intermediate groundwater zone with well screens installed at depths ranging from 17 to 56 feet within the fractured bedrock. The intermediate bedrock zone is the area of fractured rock typically encountered between the weathered bedrock zone and deeper, more competent bedrock. The weathered bedrock ranges from approximately 5 to 7 feet thick at a depth of approximately 13 to 20 feet bgs. Typically, the intermediate groundwater zone within the bedrock is moderately fractured, however, the shales and sandstones in the vicinity of MW-3I (Figure 2) are less fractured and more competent than other intermediate zone locations. The present and historical data indicate that the dominant direction of groundwater flow in the intermediate groundwater zone is east-southeast.

A deep groundwater zone occurs within the shales and sandstones. Well screens within the deep groundwater zone were installed at depths ranging from 34 to 81 feet bgs within the bedrock. The deep bedrock zone is composed of sandstone with interbedded shale; and typically more competent and less fractured than the upper intermediate bedrock zone. Fracturing occurs in upper bedrock lithological units composed primarily of shale with thin, interbedded sandstone. Groundwater flow in the deep bedrock zone is primarily east; however, in the vicinity of the 2777 building, groundwater flow is southeast and relatively unchanged even during periods of seasonal variation.

The groundwater flow generally remains in the east-southeast direction for the shallow, intermediate, and deep groundwater zones throughout each of the four quarterly sampling events.

Horizontal hydraulic gradients were calculated for the intermediate and deep monitoring well pairs. Based on groundwater elevations from the four groundwater sampling events, the horizontal hydraulic gradient for the deep groundwater zone is lower than the intermediate groundwater zone. One well pair, MW-1D to MW-5D, had a significantly lower average horizontal hydraulic gradient of 0.007 feet per foot (ft/ft). The average horizontal hydraulic gradient for the three remaining deep well pairs is 0.023 ft/ft.

Vertical hydraulic gradients were calculated for each shallow, intermediate, and deep monitoring well pair. Downward vertical gradients could be expected at all of the well clusters. However, upward hydraulic gradients were also observed at locations MW-4, MW-19, MW-20, and MW-

22. An upward gradient was observed at MW-4 in July 2012, January 2013, and April 2013 and a downward gradient was observed in October 2012. An upward gradient was also documented at well cluster MW-4 during the expanded SI completed by Ohio EPA in August 2003. An upward gradient was observed at well clusters MW-19, MW-20, and MW-22 in April 2013. The upward gradient observed at well MW-20 is also consistent with the geophysical survey completed in February 2012 that showed vertical upward fluid flow.

IV. Summary of Site Risks

EPA conducted human health and ecological risk assessments during the RI to evaluate the potential pathways by which people or animals could be exposed to site contaminants in the intermediate and deep groundwater aquifers and to calculate actual or potential risks due to those actual or potential exposures.

A. Human Health Risks

EPA conducted a baseline human health risk assessment (HHRA) to estimate the risks and hazards to human health associated with current and potential future groundwater contaminant levels. A baseline HHRA is an analysis of the potential adverse human health effects caused by exposure to hazardous substances in the absence of any actions taken to control or mitigate the contaminants under both current and future resource use scenarios. Two types of risk numbers are calculated – the excess lifetime cancer risk (ELCR) caused by carcinogenic compounds and the hazard index (HI) quotient for exposure to non-carcinogens. Calculated ELCR values present the estimated additional risk one has of contracting cancer due to exposure to a carcinogenic compound over one's lifetime. The HI expresses the potential for noncarcinogenic health effects to occur due to exposure to a dose of a chemical. A calculated HI quotient greater than one (1) indicates that a receptor may be at risk for toxic effects due to exposure to compounds above reference dose levels. EPA's target ELCR range is 1×10^{-4} to 1×10^{-6} (one in ten thousand to one in one million) and target HI quotient is 1. If site contaminants pose unacceptable health risks for current and/or future human receptors, EPA then makes a cleanup decision to reduce the risks to within the target range based on current and/or reasonably anticipated future land use.

A four-step process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of: identification of chemicals of potential concern (COPCs); exposure assessment; toxicity assessment; and risk characterization.

EPA identified the site-related VOC contaminants as COPCs in the intermediate and deep groundwater that could cause adverse health effects in exposed populations under current and future land-use scenarios. The following exposure pathways and populations were evaluated:

> **Future Residents**: Future adult and child residents were assumed to be exposed to groundwater via ingestion, dermal contact, and inhalation of VOCs released during potable groundwater use. The VI pathway is expected to be incomplete for OU2 due to depth.
>
> **Future Commercial/Industrial Workers**: Future commercial/industrial workers were assumed to be exposed to groundwater via ingestion, dermal contact (for example, resulting from washing up at a sink), and inhalation of VOCs released during potable groundwater use. As for future residents, the VI pathway is expected to be incomplete for OU2 due to depth.

EPA assumed that groundwater from OU2 would be used as a source of potable water and that commercial/industrial operations would not have on-site bathing facilities (such as showers) and, as a result, exposures via dermal contact and inhalation would be insignificant for commercial/industrial users relative to potential ingestion. At present, there is no risk to current residents from groundwater because they are connected to an alternate water supply.

Risk calculations indicate that ELCRs for future residential use of the groundwater exceed 1 x 10^{-4}, which is outside the target risk range. Calculated ELCRs ranged from 5 x 10^{-4} at the downgradient edge of the plume at MW 15D (see Figure 2) to 4 x 10^{-3} at MW3I and MW-3D located near the source of the VOC contamination. HI quotients ranged from 6 to 80. EPA identified vinyl chloride, PCE, TCE, and *cis*-1,2-DCE as COCs, as these compounds present the predominant risks at the site.

ELCR results for commercial/industrial workers are about 20 times less than those for future residents. Risks for commercial/industrial workers are within EPA's risk range (1 x 10^{-4} to 1 x 10^{-6}) due to lower expected exposure levels than for residential use. HI quotients ranged from 0.5 to 5.

B. Ecological Risks

EPA conducted a screening level ecological risk assessment to evaluate potential risks to area animals if no cleanup action was taken. EPA concluded that ecological receptors would not be exposed to the COCs in the intermediate and deep groundwater aquifers.

V. Basis for Action

It is EPA's current judgment that the preferred alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

VI. Scope and Role

EPA's preferred alternative for OU2 would be the final remedial action proposed for the Copley site and would address all COCs in the intermediate and deep groundwater aquifers. EPA has initiated cleanup measures for OU1, which includes the contaminant source area and the VOC contaminant plume in the shallow groundwater aquifer, by applying a chemical reducing agent and microbes with feedstock to the shallow aquifer and conducting a monitoring program to track cleanup progress. This data will be used to determine if a second application is necessary. EPA also connected 26 residences to the Akron municipal water supply and installed sub-slab depressurization systems in 8 residences to help prevent potential vapor intrusion hazards.

Principal Threat Waste

EPA does not consider the groundwater contaminant plume in the intermediate and deep aquifers to be a principal threat waste.

VII. Remedial Action Objectives

EPA developed the following Remedial Action Objectives (RAOs) to protect the public and the environment from potential health risks posed by the COCs in the intermediate and deep aquifers:

- Prevent future human exposure to site groundwater that contains COCs at concentrations that exceed the National Primary Drinking Water Standards (40 Code of Federal Regulations [CFR] Part 141) and/or Ohio Primary Drinking Water Standards (Ohio Administrative Code [OAC] 3745-81).

- Restore groundwater quality to its highest level of beneficial use to the extent practicable within a timeframe that is reasonable.

Groundwater cleanup levels for COCs are:

COC	Cleanup level	Source
Vinyl chloride	2 micrograms per liter (µg/L)	MCL
TCE	5 µg/L	MCL
PCE	5 µg/L	MCL
cis-1,2-DCE	70 µg/L	MCL

VIII. Development of Remedial Alternatives

The remedial alternatives evaluated in the OU2 FS are summarized below:

Alternative 1 – No Action

Alternative 2 – In-situ Groundwater Treatment: Chemical Reduction

Alternative 3 - In-situ Groundwater Treatment: Enhanced Bioremediation

Alternative 4 – Monitored Natural Attenuation

EPA also evaluated the use of institutional controls (ICs) in conjunction with each of the above alternatives to help prevent exposure to COCs until cleanup levels are achieved.

Description of Remedial Alternatives

Alternative 1 – No Action

Under the No Action alternative, EPA would take no further actions to address potential human exposure to the COCs in the intermediate and deep groundwater aquifers. The No Action alternative is included in the list of OU2 alternatives evaluated in the FS to be consistent with the NCP and it is used as a baseline for comparisons to the other OU2 alternatives. No cost is associated with this alternative because no action is taken. Because no action would be taken to reduce the concentrations of the COCs in deeper groundwater, EPA would need to conduct a review of the remedy protectiveness every five years ("five year review" or "FYR") until MCLs are reached at the site in accordance with CERCLA and the NCP.

Alternative 2 – In-situ Groundwater Treatment: Chemical Reduction

Under Alternative 2, EPA would inject a chemical reducing agent into the intermediate and deep aquifers to reductively dechlorinate the COCs in the groundwater and reduce them to nontoxic end products, including ethene and ethane. As used in OU1, the reducing agent would be nanoscale (microscopic) zero-valent iron (ZVI) in powder form, which has been proven highly effective at treating (destroying) chlorinated solvents. The nanoscale ZVI would be injected as a slurry with water into the deeper aquifers and the nanoscale particles should reach the smaller fractures in the bedrock. Upon completion of the ZVI injections, EPA would monitor groundwater quality until MCLs are achieved.

Treatment by ZVI has been shown to be immediately effective and sustainable for an extended period of time. After treatment by ZVI, the groundwater would be in an anaerobic state, which is favorable for stimulating the growth of naturally-occurring microorganisms capable of degrading chlorinated compounds not treated directly by the ZVI into water and carbon dioxide. If necessary, treatment of the groundwater COCs could be further enhanced through the addition of microbes and a soluble substrate (nutrients and an electron acceptor or energy source ("food")) so that the microbes could biodegrade residual COCs by consuming them.

This technology is expected to have a high degree of effectiveness. The estimated total cost of Alternative 2 is $4,863,640. It would take about 3 months each for up to two injections of reducing agent, spaced up to two years apart. Subsequently it may be necessary to inject microbes and substrate with an estimated 2-5 years of groundwater monitoring after the final injection until cleanup levels are met. EPA would need to conduct a FYR every five years at the site in accordance with CERCLA and the NCP until MCLs are reached for all COCs in all media (shallow, and intermediate and deep groundwater).

Alternative 3 – In-situ Groundwater Treatment: Enhanced Bioremediation

Under Alternative 3, EPA would inject microbes and a soluble substrate (nutrients and an electron acceptor or energy source ("food")) into the intermediate and deep aquifers so that naturally-occurring microbes and the added microbes could reductively dechlorinate the COCs in the groundwater and reduce them to nontoxic end products, including water and carbon dioxide.

An enhanced bioremediation system could be implemented if reducing conditions are present in the bedrock aquifer. To increase degradation rates, microorganisms could be injected into the aquifers with the soluble substrate to produce optimum conditions for achieving dechlorination.

Enhanced bioremediation is expected to be moderately effective in the source area (and would be optimized if used in conjunction with ZVI, as listed in Alternative 2). The estimated total cost of Alternative 3 is $4.21 Million. It would take about 2 months for each application to fully apply the substrate and additional microorganisms and then an estimated 2-5 years of groundwater monitoring after the final application until cleanup levels are met. This technology is expected to have moderate to high costs because of multiple injections of substrate may be required to achieve groundwater cleanup levels. EPA would need to conduct a FYR every five years at the site in accordance with CERCLA and the NCP until MCLs are reached for all COCs in all media (shallow, and intermediate and deep groundwater).

Alternative 4 – Monitored Natural Attenuation (MNA)

Under Alternative 4, EPA would monitor groundwater quality in OU2 to determine if natural attenuation processes would achieve cleanup levels in OU2 within a reasonable amount of time. Water quality parameters including dissolved oxygen, turbidity, pH, temperature, specific conductance, methane, ethane, ethene, total organic carbon, alkalinity, nitrogen, nitrate, nitrite, sulfate, sulfide, manganese, ferrous iron, and chloride would be monitored along with COC concentrations to determine if MNA was effective.

Because EPA is addressing the VOC source area under the OU1 remedy, MNA alone could be effective for OU2 because VOCs would no longer be available to migrate into the intermediate and deep aquifers. Additional cleanup actions might be necessary, however, if long-term monitoring indicates that rebound of COCs is occurring or degradation appears to be stalling before non-toxic degradation products have been reached.

MNA is easy to implement because it relies on natural biochemical and physical processes. The estimated total cost of Alternative 4 is $2.46 Million. The time to reach cleanup levels is estimated at 30 years. Low to moderate capital, maintenance, and monitoring costs are associated with MNA; therefore, the costs for implementing MNA are lower compared to Alternatives 2 and 3.

EPA would need to conduct a FYR every five years at the site in accordance with CERCLA and the NCP until MCLs are reached for all COCs in all media (shallow, and intermediate and deep groundwater).

<u>Institutional Controls</u>

Institutional controls are legal and administrative mechanisms used to implement land use and access restrictions to limit the exposure of future landowners or users of the property to hazardous substances present on the property and to maintain the integrity of the response action. ICs are required on a property where the selected remedial goal allows contamination to remain at the property above levels that allow for unlimited use and unrestricted exposure. Implementation of ICs includes requirements for monitoring, inspections, and reporting to ensure compliance.

Legal mechanisms include proprietary controls such as restrictive covenants, negative easements, equitable servitudes, lease restrictions, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other existing land use management systems that are intended to ensure compliance with land use restrictions. ICs are more effective if they are layered or implemented in series. Layering means using several ICs at the same time to enhance the protectiveness of the remedy. ICs may be implemented in series to enhance both the short- and long-term effectiveness of the remedy. Monitoring and inspections would be conducted to ensure compliance.

ICs would prevent use of contaminated groundwater and protect and maintain the integrity of the remedial action.

ICs will be selected and issued in conjunction with Alternatives 2, 3, or 4, above.

Evaluation of Alternatives

EPA uses nine criteria to evaluate remedial alternatives in order to select a remedy (see Table 1).

Table 1: The Nine Criteria

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Threshold Criteria
1. Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to the public health and the environment through engineering controls, treatment, or ICs**.**
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirement that pertain to the site, or whether a waiver is justified.
Balancing Criteria
3. Long-term Effectiveness and Performance considers the ability of an alternative to maintain protection of human health and the environment over time.
4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the 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 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 cost is the total of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50% to -30%.
Modifying Criteria
8. State Acceptance considers whether the State agrees with EPA's analyses and recommendations, as described in the RI/FS and the Proposed Plan.
9. Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Comparative Analysis of Remedial Alternatives

This section of the Proposed Plan evaluates the relative performance of each alternative against the Nine Criteria, noting how each compares to the other alternatives under consideration. A more detailed analysis of the OU2 alternatives is found in the FS. Table 2 provides a summary of the comparison of the remedial alternatives.

1. Overall Protection of Human Health and the Environment

Alternative 1 is not protective of human health and the environment because no action is taken to reduce COCs to their MCLs or to prevent direct exposure to the COCs in the groundwater.

Alternative 2 would be protective of human health and the environment because the ISCR treatment would reduce the concentration and mobility of COCs in the groundwater. ICs would help prevent the use of groundwater for drinking until cleanup levels are met.

Alternative 3 would be protective of human health and the environment because enhanced bioremediation would reduce the concentration and mobility of COCs in groundwater. ICs would help prevent the use of groundwater for drinking until cleanup levels are met.

Alternatives 4 would be protective of human health and the environment because MNA could reduce the concentration and mobility of COCs in groundwater over a long period of time. ICs would help prevent the use of groundwater for drinking until cleanup levels are met.

2. Compliance with ARARs

Alternative 1 would not comply with the Safe Drinking Water Act (SDWA) requirements because no measures would be taken to restore the groundwater to drinking water standards, or prevent exposure to unacceptable groundwater contamination.

Alternatives 2, 3, and 4 would meet all potential ARARs that would apply to the various technologies, and would meet the SDWA requirements to restore the aquifer to drinking water standards. The State's underground injection control (UIC) regulations are considered ARARs for Alternatives 2 and 3; however, it is likely that the UIC requirements will not modify the action since remediation projects fall under a state exemption known as "Class V 5X26 Aquifer Remediation Projects." This exemption would need to be filed with Ohio EPA at least one month before any injections begin.

3. Long-term Effectiveness and Permanence

Alternative 1 has no ability to maintain effective protectiveness of human health and the environment over time.

Alternative 2, and Alternative 2 coupled with Alternative 3 are considered to have the greatest degree of long-term effectiveness and permanence because they would reduce concentrations of COCs in OU2 groundwater by in situ treatment. ICs would help prevent the use of groundwater for drinking until cleanup levels are met. The adequacy and reliability of this alternative would depend on maintenance and enforcement of ICs until the groundwater achieved remedial action objectives.

Alternative 4 would have a lesser degree of long-term effectiveness and permanence because it would reduce concentrations of COCs in OU2 groundwater over a long period of time under natural processes. The long-term adequacy and reliability of this alternative would depend on maintenance and enforcement of ICs until the groundwater achieved remedial action objectives.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternatives 1 and 4 do not use treatment to reduce the toxicity, mobility, or volume of the VOC contaminants in the intermediate and deep aquifers.

Alternatives 2 and 3 use treatment to destroy the VOCs in the groundwater either through chemical reduction or bioremediation. Portions of the plume would be subject to natural attenuation processes as well, which would reduce the toxicity and volume (mass) of residual COCs in the downgradient portions of the contaminant plume.

5. Short-term Effectiveness

Under Alternatives 1 and 4, there would be little to no risks to the community during implementation because these alternatives would not involve construction of any remedial action components. Minimal risks to site workers would be present during each sampling round taken.

Because the ISCR or bioremediation agents would be injected over a 2-3-month time period, Alternatives 2 and 3 would pose minimal risk to the community and site workers however would create no adverse environment impact during construction in the short term.

6. Implementability

Alternative 1 does not require remedy construction, operation of a remedial system, or placement of ICs and therefore is readily implementable.

Alternatives 2 and 3 require a moderate level of readily-available resources for a short duration. There is a concern about effective delivery of the treatment amendments to reach the COCs in the deeper portions of the fractured bedrock aquifer, but it should be manageable and not interfere with the effectiveness of the alternatives. Delivery of the treatment amendments will be addressed during the remedial design.

Alternatives 2, 3, and 4 contain routine groundwater monitoring and require a moderate level of resources that are likely to be readily available over the time period needed to monitor the remedy.

7. Cost

Alternative 1 would cost nothing.

Alternative 2 is the most expensive alternative at an estimated $4,863,640.

Alternative 3 is projected to cost $4,208,483.

Alternative 4 is the least expensive action alternative at an estimated $2,458,987.

8. State/Support Agency Acceptance

Ohio EPA has indicated that it would support Alternative 2 as the preferred remedial action for OU2.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends. Community comments and EPA's responses to all comments will be available in the Responsiveness Summary of the ROD.

Table 2: Remedial Alternatives Screened Against the Nine Criteria

Evaluation Criterion	Alternative 1 No Action	Alternative 2 In-situ Chemical Reduction	Alternative 3 Enhanced Bioremediation	Alternative 4 Monitored Natural Attenuation
1. Overall Protection of Human Health and the Environment	Does not meet	Fully meets	Fully meets	Fully meets
2. Compliance with ARARs	Does not meet	Meets	Meets	Meets
3. Long-term Effectiveness and Permanence	Does not meet	Fully meets	Fully meets	Meets
4. Reduction of Toxicity, Mobility, or Volume through Treatment	Does not meet	Fully meets	Fully meets	Does not meet
5. Short-term Effectiveness	Fully meets	Meets	Meets	Fully meets
6. Implementability	Meets	Partially Meets	Partially Meets	Fully Meets
7. Cost	$0	$4.86M	$4.21M	$2.46M
8. State Acceptance	No	Yes	No	No
9. Community Acceptance	To be determined	To be determined	To be determined	To be determined

Preferred Alternative

EPA's preferred alternative is **Alternative 2** – In-situ chemical reduction with ZVI, potentially coupled with microbe and substrate injection. Under Superfund law, the selected remedy must meet the threshold criteria of Overall Protection of Human Health and the Environment, and Compliance with ARARs. Alternative 2 will be protective of human health and environment by destroying the VOCs in the intermediate and deep aquifers, thereby achieving the RAOs of meeting groundwater cleanup levels and restoring the aquifers to the highest beneficial use practicable. Alternative 2 will also comply with chemical, location, and site-specific ARARs identified in the FS.

Long-term effectiveness and permanence will be achieved in Alternative 2 by destroying the VOCs in the aquifers, especially since EPA is currently treating the shallow aquifer and source area, which will prevent future contamination in the intermediate and deep aquifers. The preferred alternative will be implementable because equipment and supplies are readily available for construction of the remedy. Alternative 2 will be short-term effective because construction time is of a short duration and workers and the community can be protected through standard safety measures.

The final two criteria, state acceptance and community acceptance, will be evaluated after the public comment period for this Proposed Plan.

Estimated Capital Cost: $3,087,000
Estimated Annual O&M Cost: $317,316 (year 1) - $79,329 (years 2-5)
Estimated Total Present Worth Cost: $4,860,000
Estimated Construction/Implementation Timeframe: 2-5 years

Community Participation

Public Comment Period: EPA will open a public comment period on July 6, 2015 and close it on August 5, 2015. During this time, the public is encouraged to submit comments on the Proposed Plan. The public may also request that EPA hold a public meeting in the Copley area to discuss the Proposed Plan.

It is important to note that although EPA has proposed a preferred alternative, the final remedy has not yet been selected for the site. All comments received will be considered and addressed by EPA before the final remedy is selected.

Detailed information on the material discussed in this document may be found in the site Administrative Record. These materials include the RI, the FS and other information used by EPA in the decision-making process. EPA encourages the public to review the Administrative Record in order to gain a more comprehensive understanding of the site and the Superfund activities that have taken place there. Copies of the Administrative Record are available at the following locations:

U.S. EPA-Region 5
Record Center, Room 711
77 West Jackson Boulevard
Chicago, IL 60604
Monday – Friday 8 a.m. to 4 p.m.

Fairlawn-Bath Library
3101 Smith Road
Akron, Ohio
Hours: 10AM – 6PM
(330) 666-4888

Written comments, questions about the Proposed Plan, and requests for information or for a public meeting can be sent to either EPA representative below:

Margaret Gielniewski (SR-6J)	Susan Pastor (SR-5J)
Remedial Project Manager	Community Involvement Coordinator
Region 5 EPA	Region 5 EPA
77 West Jackson Boulevard	77 West Jackson Boulevard
Chicago, IL 60604	Chicago, IL 60604
gielniewski.margaret@epa.gov	pastor.susan@epa.gov

Following the conclusion of the public comment period on the Proposed Plan, EPA will prepare a Responsiveness Summary. The Responsiveness Summary will summarize and respond to comments received on EPA's preferred alternative. EPA will then prepare the ROD that summarizes the decision process and the alternative selected for addressing OU2. The ROD will include the Responsiveness Summary. Copies of the ROD will be available for public review in the information repositories listed above.