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Record of Decision

West Troy Contaminated Aquifer
Superfund Site
Troy, Miami County, Ohio

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois
2020

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LIST OF ACRONYMS/ABBREVIATIONS

AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
cis-DCE	cis-1,2-dichloroethene
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
EPA	United States Environmental Protection Agency
ESV	Ecological Screening Value
FS	Feasibility Study
FSP	Field Sampling Plan
GMR	Great Miami River
GPM	Gallons per Minute
HHRA	Human Health Risk Assessment
HI	Hazard Index
ISCO	In-Situ Chemical Oxidation
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
Ohio DNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
PCE	Tetrachloroethene
POTW	Publicly-Owned Treatment Works
PRG	Potential Remediation Goal
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SITE	West Troy Contaminated Aquifer Superfund Site
SLERA	Screening Level Ecological Risk Assessment
TCE	Trichloroethene
UIC	Underground Injection Control
UST	Underground Storage Tank
UU/UE	Unlimited use and Unrestricted Exposure
VI	Vapor Intrusion
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound
WTCA	West Troy Contaminated Aquifer

This Record of Decision (ROD) documents the selected site-wide remedy for the West Troy Contaminated Aquifer Superfund Site (WTCA Site or Site) in Troy, Miami County, Ohio. The ROD is organized in three sections: Part I contains the Declaration for the ROD, Part II contains the Decision Summary and Part III contains the Responsiveness Summary.

Part I: Declaration

The Declaration summarizes the information presented in the ROD and includes the authorizing signature of the Director of the Superfund & Emergency Management Division, United States Environmental Protection Agency (EPA), Region 5.

Site Name and Location

West Troy Contaminated Aquifer Superfund Site
Troy, Miami County, Ohio
National Superfund Identification Number: OHN000508132

Statement of Basis and Purpose

This decision document presents the selected site-wide remedy for the WTCA Site, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. §9601 *et seq* and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 C.F.R. Part 300. This decision is based on the Administrative Record (AR) file for this Site. The AR Index identifies each of the items comprising the AR upon which the selection of the remedial action is based.

The Ohio Environmental Protection Agency (Ohio EPA) has indicated that it will concur with the selected remedy.

Assessment of Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

This ROD sets forth the final site remedy for volatile organic compound (VOC) hazardous waste contamination in groundwater and soil vapors at the WTCA Site (*see* Figure 1, Site Location Map). The selected remedy is groundwater alternative GW-3C, private well alternative PR-3 and vapor intrusion alternative VI-2. This remedy will address potential exposure to VOCs in groundwater and soil vapors, exceeding drinking water standards and risk, respectively, by treating the contaminated groundwater at the Site; removing an affected private well on one

property and connecting this property to the City of Troy municipal water supply; placing institutional controls (ICs) on affected land and groundwater use during the Site remedy; and monitoring during the Site remedy both the groundwater and the potential for any residential use elevated future vapor intrusion (VI) risk.

The selected Site remedy involves three components including groundwater, private well and VI. Since there was no evidence of elevated soil contamination or current commercial/industrial VI risk associated with the Site during the EPA investigations and there is no current residential use of Site property, the focus of the VI alternative is based on the potential of any elevated future residential VI risk. The selected Site remedy includes the following components:

- Groundwater Alternative GW-3C (Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring);
- Private Well Alternative PW-3 (Connect to City of Troy Municipal Water and Abandon Private Well); and
- Vapor Intrusion Alternative VI-2 (ICs and Monitoring).

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The Site remedy is consistent with the statutory mandate for permanence and treatment to the maximum extent practicable. This selected remedy action does utilize groundwater treatment as a principal element of the remedy that will permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants.

The statutory preference for treatment of principal threat waste does not apply to soils because there is no known principal threat waste in the soils above the Site groundwater table.

A review will be conducted every five years after commencement of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment because the remedy will result in hazardous substances remaining on-Site above levels that allow for unlimited use and unrestricted exposure (UU/UE) until remedial action objectives (RAOs) are achieved.

ROD Data Certification Checklist

The following information is included in the Decision Summary section (Part II) of this ROD. Additional information can be found in the AR file for the Site.

- Contaminants of concern (COCs) and their respective concentrations (Section 5.3);

- Baseline risk represented by the COCs (Section 7.0);

- Cleanup levels established for COCs and the basis for the levels (Sections 7.1 and 8.0);
- Assumptions (primarily related to soil exposures) in the baseline risk assessment and the ROD (Sections 7.0);
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and ROD (Section 7.0);
- Potential land use that will be available as a result of the selected remedy (Section 6.0);
- Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section 9.0); and
- Key factor(s) that led to selecting the remedy (Section 10.0).

Support Agency Acceptance

Ohio EPA supports the selected remedy. EPA received an August 18, 2020 letter from the Director of Ohio EPA expressing concurrence with the selected remedy.

Authorizing Signature

9/2/2020

X 

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

Part II: Decision Summary

1.0 Site Name, Location and Description

Name: West Troy Contaminated Aquifer (WTCA) Superfund Site
Location: Troy, Miami County, Ohio
National Superfund Identification Number: OHN000508132
Lead Agency: EPA
Support Agency: Ohio EPA

The WTCA Site includes an area of contaminated groundwater and the associated land above it. The Site extends southeast from a commercial/industrial property location at 515 North Elm Street including portions of Treasure Island Park owned by the City of Troy and contaminated groundwater extending underneath the Great Miami River (GMR) to the City of Troy Production Well P-12W near the east bank of the river. (*See* Figures 1 and 2).

2.0 Site History and Enforcement Actions

2.1 Site History

Groundwater contamination was first detected in a City of Troy production well in 1986. Tetrachloroethene (PCE) is the primary VOC detected in the production well and in the groundwater plume. In particular, PCE has historically been periodically detected in samples from P-12W at concentrations above the EPA Maximum Contaminant Level (MCL) standard for PCE. Lower concentrations of other VOCs – primarily trichloroethene (TCE) and cis-1,2-dichloroethene (cis-DCE) – have been detected in this well on occasion, but at concentrations below MCLs. The compound cis-DCE has also been occasionally detected at concentrations below its MCL in Production Well P-3W. The City of Troy currently utilizes an air stripper to pre-treat water obtained from Production Well P-12W, removing VOCs before the water enters the City's water treatment plant and distribution system. PCE has also been detected above the MCL at a private well not used for drinking water on the 515 N. Elm Street property.

The City of Troy obtains its public water supply from two well fields, the East Well Field and West Well Field, located approximately a mile apart, on the east bank of the GMR. Both well fields draw water from the deeper portions of the sand and gravel deposits that underlie the vicinity. The City of Troy public water system serves a population of approximately 28,000 people. P-12W is the only production well being utilized in the West Well Field. The locations of the City of Troy East and West Well Fields are shown on Figure 2.

A similar but distinct groundwater VOC contamination plume exists in another portion of the City of Troy, with different sources for its contamination. EPA also is addressing this groundwater plume, identified as the East Troy Contaminated Aquifer Site, independent of the WTCA Site.

2.2 Federal and State Investigations and Removal Actions

Investigations completed by Ohio EPA before the EPA remedial investigation (RI) at the WTCA Site indicated that the contamination detected in the City of Troy West Wellfield originated from one or more sources on the west side of the GMR. Based on historical information from the previous investigations and the EPA RI, the plume is believed to originate at or near the former Wampler Buick/GMC (an owner and operator at the 507 and 515 N. Elm Street properties). Affordable Auto subsequently occupied the 515 N. Elm Street property. The 507 N. Elm Street property is currently occupied by Bob's Auto Repair and Apex Racing currently occupies the 515 N. Elm Street property. (*See* figures 3 and 4). These two properties are located approximately 1,500 feet northwest of Troy Production Well P-12W. Information derived from previous investigations indicated that the VOC plume extends from the 507 and 515 N. Elm Street property area under the GMR and to Production Well P-12W on the east side of the GMR. P-12W PCE concentrations since 1997 had been consistently detected and at times above its MCL of 5 micrograms per liter (µg/L) or parts per billion (ppb); however, PCE has only been detected above its MCL three times since October 2014 (February 2016, April 2016, and April 2018).

Ohio EPA began compiling information on the Troy West Wellfield in 1991. In 1992, Ohio EPA removed four underground storage tanks (USTs) from the 507 N. Elm Street property, conducted a soil investigation, and removed contaminated soils in the vicinity of the USTs. The first Ohio EPA field investigation began in 1997. Subsequent investigations focused on the Troy West Wellfield. Ohio EPA and its contractors conducted four additional investigations between 2001 and 2010 to identify potential sources of VOC contamination, the migration of contaminants to neighboring properties and any impacts to P-12W or private wells. Those investigations resulted in EPA listing the Site on the Superfund Program National Priorities List (NPL) in 2012.

EPA conducted the WTCA Site RI activities in two phases between 2015 and 2017. The RI included two extensive phases of field sampling including the following activities between 2015 and 2017: a geophysical survey on the 507 and 515 N. Elm Street properties to evaluate the potential presence of unknown contaminant sources such as buried drums or tanks; an ecological habitat and risk assessment; a soil gas investigation on the 507 and 515 N. Elm Street properties; soil boring, surface water and sediment sampling; a groundwater vertical profiling investigation at and downgradient of the suspected historical source area; VI sampling; redevelopment of older (pre-RI) groundwater monitoring wells; installation of additional new groundwater monitoring wells; and sampling of monitoring wells.

Following the RI, EPA developed a feasibility study (FS) report detailing the remedial alternatives evaluated for the groundwater contamination plume, the affected private well on the 515 N. Elm Street property, and the potential for VI associated with current and future land use at the WTCA Site. All FS Report remedial alternatives assume that the City of Troy would continue operating an air stripper to pre-treat groundwater obtained from P-12W until contaminant levels in the P-12W extracted groundwater consistently achieve the remedial action objectives (RAOs) without the need for air stripper pre-treatment.

EPA did not enter into an Administrative Order or enforcement activity with any PRP to conduct Site removal or investigation activities.

3.0 Community Participation

EPA announced the RI/FS process for the WTCA Site with notice of public availability session meetings from December 15 through 17, 2015 at the West Room at the Troy-Hayner Cultural Center, 301 W. Main Street, Troy, Ohio. EPA representatives were available from 9 am to 7:30 pm to speak to community members primarily at the West Room at the Troy-Hayner Cultural Center but also met with community members at other locations if requested. EPA representatives met with residents, local officials and other interested community members who responded to EPA's postcards and phone calls to set up community interviews. During the meetings, EPA provided a description of the RI/FS process and the upcoming investigations at the Site. In 2012, EPA listed the WTCA on the NPL, dividing the Troy contaminated aquifer site into the WTCA Site and the East Troy Contaminated Aquifer Site.

Throughout EPA's involvement in the Site, EPA kept the community and other interested parties apprised of Site activities through a public website, a Community Involvement Plan and fact sheets, press releases, and meetings with the public. EPA provided the public with a Site Community Involvement Plan in January 2017 to detail a description of the ongoing and upcoming Site activities. On June 11, 2020, EPA released to the public the WTCA Site Proposed Plan.

EPA placed copies of all documents EPA used to support the WTCA Site Proposed Plan into the AR file, including the RI and FS Reports and the Proposed Plan. These documents can be found with other pertinent documents in the AR file which can be accessed on EPA's web site for the WTCA Site at: www.epa.gov/superfund/west-troy-aquifer. The AR file is also maintained at two public repositories: the EPA Region 5 Docket Room, 77 West Jackson Boulevard (7th Floor) Chicago, Illinois; and the Troy-Miami County Public Library, Local History Branch, 100 W. Main Street, Troy, Ohio.

On June 11, 2020, EPA published notice of the availability of these documents and the release of the WTCA Site Proposed Plan in the local Miami Valley Today newspaper. This EPA notice also announced that EPA would be holding a virtual public meeting on June 24, 2020 to discuss the WTCA Site Proposed Plan and a 30-day public comment period to run from June 15 to July 14, 2020, during which EPA would accept public comments on the Proposed Plan. At the virtual meeting, EPA representatives answered questions about the Site and the remedial alternatives. EPA also used this meeting to solicit questions and formal comments on the Proposed Plan as part of the public comment period. EPA did not receive any formal comments during the public comment period and this is noted in the Responsiveness Summary, which is Part 3 of this ROD.

4.0 Scope and Role of Operable Unit

This site-wide remedy addresses all the contaminant areas of concern for the WTCA Site in one operable unit. The selected remedy will address treatment of contaminated groundwater at the Site; connecting an affected commercial property on Site to the City of Troy municipal water supply and removing the private well; placement of ICs on affected land and groundwater use during the Site remedy; and monitoring during the Site remedy for the potential of any elevated future residential VI risk. Since there was no evidence of elevated soil contamination or current VI risk associated with the Site during the EPA investigations, the selected remedy for the Site does not require a soil source area remedy component.

5.0 Site Characteristics

The land use at the Site includes predominantly commercial and industrial properties and the City of Troy Treasure Island parkland that runs adjacent to and up to the edge of the GMR, with the exception of an approximately 3-acre capped area of open grassland (the former Hobart Lagoon) which is also owned by the City of Troy. Commercial industrial facilities are currently located on the Site at 507 and 515 N. Elm Street. Site land use also includes land above the contaminated groundwater extending underneath the GMR to the City of Troy Production Well P-12W near the east bank of the GMR. There are no residential buildings on Site, nor are there current plans for such buildings. Land uses in the surrounding areas of the Site are predominantly developed with light/heavy commercial and industrial sites, residential community, and an area of hardwood trees and brush.

The WTCA RI obtained site-specific geologic information from the following activities: four soil borings drilled and logged for monitoring well installation in Phase I; 30 shallow soil borings for soil sampling in Phase II; two soil borings drilled and logged for monitoring well installation in Phase II; eight soil borings drilled for additional soil sampling in Phase II; and eight additional Phase II deep vertical aquifer sampling (VAS) soil borings. Indirect geologic logging data, acquired from approximately 40 locations during the groundwater vertical profiling programs, supplemented the information gathered from these boring and sampling activities. Ohio EPA also provided additional information from their historical investigations.

5.1 Conceptual Site Model

The RI/FS developed a conceptual site model (CSM) to identify appropriate exposure pathways and receptors for evaluation in the risk assessment. Historical release of VOCs to the soils and groundwater resulted in a groundwater plume that extends from the 507 and 515 N. Elm Street properties southwest to City of Troy production well P-12W. The influence of P-12W on Site groundwater flow has created a draw of the Site groundwater plume toward and down to the P-12W screen depth of 66-86 feet below ground surface (bgs). The primary VOC of concern is PCE. PCE has also been detected at maximum level of 10 ppb at a private well not used for drinking water on the 515 N. Elm Street property. Figures 4 and 5 illustrate a general identification of the Site groundwater plume, exposure pathways, exposure routes, and receptors

included in the RI and FS reports risk assessment sections; and Figures 6 and 7 illustrate the CSM developed in the RI report risk assessment section.

The remedial action selected in this ROD will address the risk to human receptors primarily due to direct contact, ingestion and inhalation exposure to VOCs, such as PCE, in contaminated soils, groundwater and vapors at the Site. The primary exposure pathway of concern at the WTCA Site is ingestion of elevated VOCs in groundwater through drinking water. The potential receptors include current/future industrial/commercial workers, future residents and current/future construction workers.

5.2 Physical Characteristics

5.2.1 Site Geology

The WTCA Site lies above a deep, pre-glacial bedrock valley that trends north to south, down the approximate center of the southern half of Miami County. The GMR follows the course of this valley, and the river and valley are the most significant geomorphic features in the county. Miami County is generally covered by glacial drift left behind by retreating continental glaciers. These drift deposits covered the bedrock and filled existing pre-glacial stream valleys. Bedrock is generally exposed at the surface only in upland areas adjacent to streams, where erosion has removed the thinner drift deposits. Near-surface soils encountered have been regraded during the long history of commercial, industrial, and recreational uses in the area. As shown in cross sections, the following unconsolidated materials were generally observed (from shallow to deep): Topsoil or fill; sandy or silty clay; fine to coarse sand with varying amounts of gravel; and stiff dense clay till (not always encountered) or silty clay.

5.2.2 Hydrogeologic Conditions

Hydrogeologic aspects of the WTCA Site were evaluated through various data acquisition activities, including: review of extensive background information in reports by the City of Troy, Ohio EPA, and other entities; review of logs of local production and monitoring wells; advancement of approximately 40 soil borings, VAS borings, and installation of six groundwater monitoring wells during the RI; acquisition of multiple rounds of groundwater elevation data from the newly installed RI monitoring wells and other existing monitoring wells in the area; and acquisition of data regarding stratigraphy and relative hydraulic conductivity of the subsurface during the VAS programs. The deepest borings during the RI ranged from about 65 to 85 feet bgs for deep VAS conducted downgradient of the Site near the west and east banks of the GMR.

Regional groundwater flow is down the GMR Valley, generally north to south on a regional scale, but with local variations. Groundwater within Miami County occurs in both glacial (unconsolidated) and bedrock (consolidated) aquifers. The thick sequences of sand and gravel in the valley of the GMR and its major tributaries comprise a highly productive aquifer system. The sand and gravel aquifer within the present-day GMR Valley is a federal-designated Sole Source Aquifer System, a designation to protect drinking water supplies in areas with few or no alternative sources of drinking water. The buried valley sand and gravel aquifer is heavily used throughout much of the Miami Valley as a source of water by both municipal entities and private

residences. Troy supplies the entire city water system from wells that draw water from the sand and gravel deposits that comprise the GMR Sole Source aquifer.

Depth to groundwater at the Site is relatively shallow, typically ranging from approximately 5 to 15 feet bgs (in monitoring wells), but varies depending on location and seasonal variations. Generally, Site topography is flat with a relatively consistent slope toward and in the downstream direction of the GMR. The Treasure Island Park area lies about 5 to 10 feet lower in elevation than the terrace where the 507 and 515 N. Elm Street properties are located, and the depth to water decreases closer to Treasure Island Park and the GMR.

5.2.3 Surface Water Hydrology

The GMR water depth varies but is typically approximately only two to three feet deep near the Site with little flowrate since the flow is restricted near the Site. The municipal production well P-12W is screened from 66 to 86 feet bgs beyond the east bank of the river. The flow of impacted groundwater at the Site appears to be heavily influenced by pumping from P-12W but not by the GMR. P-12W has historically operated at approximately 1,200 gallons per minute (gpm).

5.3 Nature and Extent of Contamination

EPA conducted the WTCA Site RI field activities between 2015 and 2017 to define the nature and extent of Site contamination. During the RI, various environmental media were sampled in Phase I and II. These media include (1) groundwater; (2) soil, surface water and sediment; and (3) soil gas, sub-slab vapor, and indoor air. This section of the ROD summarizes the information available from these investigations, including the type of contamination, known or suspected sources of contamination, affected media and the extent of contamination. The concentrations of contaminants detected in samples were compared to human health and ecologically based criteria in the risk assessment. The 2017 Final RI Report provides additional detail about the Site investigations.

5.3.1 Contaminants of Concern

EPA identified VOCs, including PCE, TCE, cis-DCE and benzene as contaminants of concern at the Site. PCE is known to chemically breakdown to form TCE, DCE and vinyl chloride. In addition, the breakdown of TCE in the subsurface is known to form cis-DCE. Exposure to VOCs such as PCE or TCE can result in adverse effects to human health. Long-term exposure by humans to VOCs can result in the development of cancer; short-term exposure risks to human health include the experience of headaches, dizziness, sleepiness, and the development of skin rash.

5.3.2 Sources of Contaminants of Concern

The RI did not identify a definitive source or sources of the PCE groundwater plume. The Site record indicates that one or more historical releases occurred on the 515 N. Elm Street property. This property historically had been occupied by Wampler Buick/GMC. Wampler Buick/GMC ceased operations and is no longer in business. This property is currently occupied by Bob’s

Auto Repair. (*See* Figures 3 and 4). The RI did not identify the release of contaminants of concern from current occupants at 507 and 515 N. Elm Street to the Site. Site contaminants of concern have been associated with a variety of business activities, including automotive repair shops, machine shops, dry cleaning establishments, and general commercial and industrial cleaning.

5.3.3 Extent of Groundwater Contamination

The RI's primary site-wide groundwater characterization activity consisted of VAS groundwater profiling samples collected in Phases I and II. Groundwater profiling consisted of advancing a depth-discrete sampling tool using direct-push drilling to advance the tool. As a result, this activity generated a large data set by obtaining samples at numerous depths at approximately 40 locations. Based on VAS results, a total of six monitoring wells (four Phase I wells and two Phase II wells) were installed to supplement the existing wells that were installed during previous Ohio EPA investigations. The RI contractor collected monitoring well samples in Phases I and II to obtain groundwater results from fixed locations that can be sampled again in the future to evaluate trends in contaminant concentrations. In addition to sampling monitoring wells, the RI contractor sampled the private well at the 515 N. Elm Street property twice during the RI and both times the PCE concentration was approximately 10 µg/L, exceeding the 5 µg/L PCE MCL.

RI results indicate that groundwater contamination exists beneath the 507 and 515 N. Elm Street properties. PCE is the primary VOC present above its MCL; however, benzene was also detected above its 5 µg/L MCL in three samples in a localized area between the 507 N. Elm Street property and the Treasure Island Park. PCE contamination extends from these properties located on the west side of the GMR to the City of Troy production well P-12W, where it is being captured by the pumping influence of the production well located just east of the GMR; however, the flow path of the PCE plume from the west side of the GMR to the City of Troy well P-12W was not conclusively identified, as PCE was detected only in VAS-1 at a low concentration (1.9 µg/L).

Key findings of the groundwater investigation include:

- In general, the PCE plume is shallower near the 507 and 515 N. Elm Street properties and becomes deeper to the southeast in the direction of groundwater flow toward P-12W.
- The maximum concentrations of PCE detected in VAS groundwater samples were 101 µg/L at VAS-21 (60 feet bgs) and 75 µg/L at VAS-32 (42 feet bgs) and the maximum concentration detected in monitoring well samples was 66 µg/L at MW-06, south of the former Hobart Lagoon.
- Since 1997, PCE has consistently been detected at P-12W and concentrations at times have been slightly above its MCL of 5 µg/L (February 2016 at 5.1 µg/L, April 2016 at 5.8 µg/L and April 2018 at 5.3 µg/L); TCE has occasionally been detected at P-12W, but concentrations have never been above its MCL of 5 µg/L and typically less than 1 µg/L; and since 2003 when cis-DCE was first detected at P-12W, concentrations have never been above its MCL of 70 µg/L and typically at less than 2 µg/L.
- Benzene was detected above its MCL in a discrete area between the 507 N. Elm Street property and the southwest portion of the former Hobart Lagoon. Benzene was detected

above its MCL in RI groundwater sampling at 23 µg/L at VAS-34 (13.5 feet bgs), at 10.9 µg/L at VAS-20 (18 feet bgs), and 6.3 µg/L at VAS-35 (23 feet bgs). The City of Troy analytical results of P-12W water samples through July 2018 have not reported a detection of benzene.

- Of the eight deep VAS borings drilled adjacent to the west and east sides of the GMR, the RI reported VOCs detected above MCLs at only one location (VAS-D1). The RI also reported that TCE was detected at VAS-D1 on the west side of the GMR at a concentration of 5.6 µg/L from a sample at 60 to 65 feet bgs, above the TCE MCL of 5 µg/L. PCE was also detected in this sample at a concentration of 1.9 µg/L, below its MCL of 5 µg/L.
- Based on RI results, the plume appears to deepen as it moves east as groundwater is drawn toward P-12W and downward toward the well screen intake depth. In addition, the location of the deep VAS boring was dictated by the physical limitations from the "Island" at the north end of the park and the river between the Site and the production well. Based on this limitation, it is possible that the VAS borings may not have encountered PCE drawn deeper in the aquifer or the borings might not have been located on the plume axis where PCE concentrations would be expected to be the highest.
- VAS and monitoring well results show that PCE was not detected above its MCL north of the 515 N. Elm Street property or west of the 507 N. Elm Street property (west of N. Elm Street). These results define the upgradient extent of the PCE plume.
- The plume appears to originate on the 507 and 515 N. Elm Street properties and migrates east-southeast toward the GMR and eventually to Troy Production Well P-12W. The RI did not identify a definitive source or sources of the PCE groundwater plume. The Site record indicates that one or more historical releases occurred on the 507 and 515 N. Elm Street properties.

5.3.4 Extent of Soil Contamination

The RI's soil sampling at the 507 and 515 N. Elm Street properties provides the primary record characterizing Site soils. The RI selected approximately 40 soil boring sampling locations based on the results of the geophysical survey, the groundwater profiling investigation, the soil gas investigation, and any location biased toward areas showing the potential for soil contamination. The RI conducted additional Phase II soil sampling in the area south of the former Hobart Lagoon, near MW-06 and VAS-21, which exhibited the highest contaminant concentrations in groundwater observed at the Site. Phase II included soil borings in this area because of elevated photoionization detector (PID) readings observed during the installation of well MW-06.

Soil sample analytical results document that the VOCs detected in soils were below residential and industrial direct contact screening levels (SLs). Although some soil VOC detections were above MCL-based protection of groundwater SLs, PCE was not detected in soil at concentrations indicating the presence of a vadose (unsaturated) zone soil contamination source area that could act as a continuing source of contamination to groundwater.

5.3.5 Extent of Surface Water and Sediment Contamination

The RI collected surface water and sediment samples from five locations. The RI collected samples in Morgan's Ditch, which is located just south of the 507 and 515 N. Elm Street

properties, and in the inlet at Treasure Island Park. The RI reported detection of very few low-level VOCs in surface water and sediment samples taken from Morgan's Ditch and the GMR. The RI reported that PCE, the main contaminant in groundwater, was not detected in any surface water or sediment sample. The types of VOCs detected and their concentrations at orders of magnitude below Site SLs, indicate that site-related surface water and sediment impacts currently are not occurring.

5.3.6 Extent of Soil Gas, Sub-Slab Vapor and Indoor Air Contamination

To evaluate the potential for site-related contaminants impacting nearby structures, the RI collected and evaluated samples from the air within the 507 and 515 N. Elm Street properties, the vapor immediately below these structures ("sub-slab vapor"), the soils between the structure and the contaminated groundwater plume, and the contaminants in groundwater near these structures. This investigation was completed to determine whether a continuous pathway exists between groundwater contaminants and contaminants found in the air of a structure, indicating whether the groundwater may be a significant source of indoor air contaminants.

The RI reports benzene, ethylbenzene, and 1,2-dichloroethane detected above vapor intrusion screening levels (VISL) in just one shallow groundwater sample collected about 100 feet east of the 515 N. Elm Street property building near the western edge of the former Hobart Lagoon, and reports chloroform detected above its VISL in two shallow groundwater samples. Carbon tetrachloride and TCE were not detected in any shallow groundwater samples. The RI also reports detection within the 507 and 515 N. Elm Street properties of 1,2-dichloroethane, benzene, carbon tetrachloride, chloroform, ethylbenzene, and TCE in one or more indoor air samples at concentrations above residential or commercial screening levels (SLs). The RI reports detecting only 1,2-dichloroethane in soil samples exceeding the residential or commercial soil SL collected at four locations on the 507 and 515 N. Elm Street properties.

With the exception of 1,2-dichloroethane, the RI report cannot conclusively attribute a pathway for site-related VOC contamination from the groundwater plume to the 507 and 515 N. Elm Street properties. Indoor air samples above SLs for carbon tetrachloride and TCE, which were not detected in the nearby groundwater plume, and other contaminants not detected above SLs in the soil samples, indicate that the groundwater plume may not be a significant source of the VOC SL exceedances found at the 507 and 515 N. Elm Street properties.

In addition, the nature of the current commercial/industrial operations occurring at the 507 and 515 N. Elm Street properties are consistent with the identified VOCs detected in their indoor air. The RI documents that the southern portion of the 507 N. Elm Street property building is an active auto repair facility in use 6 days a week. Areas of the building adjacent to Bob's Auto Repair are an office space and a Moose Lodge that is rarely occupied. Therefore, the record does not support a finding that VOCs detected in indoor air samples at the 507 N. Elm Street property are a result of VI from the Site, rather than resulting from VOCs relating to the current operations in these buildings.

6.0 Current and Potential Future Land Use

The Site predominantly is located in a mixed commercial and industrial area immediately north of the City of Troy, and extending south and east into the City of Troy's Treasure Island Park that runs adjacent to and up to the edge of the GMR, including an approximately 3-acre capped area of open grassland (the former Hobart Lagoon) which is also owned by the City of Troy. Treasure Island Park is used for a variety of recreational activities and there are recreational trails near the GMR. There are no residential buildings on-site, nor are there current plans for such buildings.

Troy supplies the entire city water system from wells that draw water from the sand and gravel deposits that comprise the GMR Sole Source Aquifer. The City of Troy system serves a population of at least 28,000 people and obtains its public water supply from two well fields, the East Well Field and West Well Field, located approximately a mile apart, on the east bank of the GMR. P-12W, associated with the WTCA Site, is the only production well being utilized in the West Well Field.

The future use of land at the Site is expected to remain unchanged from current uses: commercial/industrial use at the 507 and 515 N. Elm Street properties; grass covering the 3-acre capped property owned by the City of Troy; and the Treasure Island Park is expected to remain parkland.

7.0 Summary of Site Risks

EPA conducted a human health risk assessment (HHRA) and the screening level ecological risk assessment (SLERA) as part of the RI/FS process to evaluate the risks and hazards to human health and the environment from exposure to Site contaminants in present and reasonably anticipated future exposure scenarios. The risk assessments were prepared consistent with EPA and Ohio EPA guidance and were presented as Appendix I of the WTCA Site RI Report.

Human Health Risk Assessment

EPA conducted the HHRA to evaluate current and potential future cancer risks and hazards to human health and the environment associated with exposure to site-related contaminants of potential concern (COPC), in present and reasonably anticipated future exposure scenarios at the WTCA Site. The HHRA evaluated exposure scenarios at the Site involving potential ingestion of, dermal contact with, or inhalation of COCs in groundwater, soil and indoor air at the Site. The HHRA includes the following components: (1) data evaluation and selection of COPCs, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization. COPCs were selected following EPA guidance based on screening of maximum detected concentrations against medium-specific screening levels. The receptors considered quantitatively or qualitatively in the HHRA include current and future commercial/industrial workers, current and future construction and utility workers, and future residents.

The primary objectives of the HHRA were as follows:

- To determine if site-related constituents detected in environmental media pose unacceptable risks to current and future human receptors under baseline (unremediated) conditions; and
- To provide information to support decisions regarding the need for further evaluation or action based on current and reasonably anticipated future land use.

For the HHRA evaluation, EPA subdivided the Site into general exposure areas according to locations of current and historical land use, as well as surface water features, and a municipal wellfield. Two of the exposure areas evaluated (Morgan's Ditch and Treasure Island Lagoon) were eliminated because no COPCs were identified in these areas. Therefore, the exposure areas for which risks and hazards were quantitatively or qualitatively evaluated include the 507 and 515 N. Elm Street properties; the City of Troy West Wellfield (specifically well P-12W); and the Site property area including the groundwater plume beyond the 507 and 515 N. Elm Street properties to P-12W.

HHRA results summarized for current and future land use at the Site include the following:

- Identifying no total risks for any receptors exceeding 1E-04, the upper end of EPA's target risk range.

- Identifying the total risks within EPA's target risk range of 1E-04 to 1E-06 for the following receptor and exposure areas: current industrial/commercial workers (507 and 515 N. Elm Street properties), future industrial/commercial workers (507 and 515 N. Elm Street properties) and current/future utility workers (507 N. Elm Street property), and future residents (507 and 515 N. Elm Street) and other unoccupied areas.

- Identifying risks exceeding Ohio EPA's target risk of 1E-05 (as specified in Ohio EPA's Technical Decision Compendium Guidance, *Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for the DERR Remedial Response Program*) for future industrial/commercial workers – 507 N. Elm Street property (2E-05) and future residents – 515 N. Elm Street property (5E-05) and 507 N. Elm Street property (7E-05).

- Identifying total risks less than 1E-06, considered insignificant for the following receptor and exposure areas: current/future construction workers in Area 1 (507 and 515 N. Elm Street properties) and unoccupied areas, and current/future utility workers in the 515 N. Elm Street property and unoccupied areas.

- Identifying total hazards exceeding 1 only for future residents at the 507 N. Elm Street property and unoccupied areas.

- Identifying groundwater COPCs based on potential exposure to water from the Site "plume" as follows: Area 1 - 1,4-dichlorobenzene, benzene, PCE, carbon tetrachloride, ethylbenzene, 1,2-dichloroethane (Bob's Auto Repair only), and trichloroethene; unoccupied areas - PCE and TCE. (Note: PCE is the only COC for potable groundwater

in both areas, with an exposure point concentration of 14 µg/L and 66 µg/L respectively, which exceed the PCE MCL (5 µg/L). Groundwater COPCs based on potential exposure to water from the Site "plume" are as follows: 507 and 515 N. Elm Street properties area- 1,4-dichlorobenzene, benzene, PCE, carbon tetrachloride, ethylbenzene, 1,2-dichloroethane (507 N. Elm Street property only), and trichloroethene; unoccupied areas - PCE and TCE. (Note: PCE is the only COC for potable groundwater in both areas, with an exposure point concentration of 14 µg/L and 66 µg/L in unoccupied areas, which exceed the PCE MCL (5 µg/L).

- Identifying significant VI risks (≥ 1E-06) or hazards (>1) – based on measured indoor air concentrations (507 and 515 N. Elm Street properties) and VISL modeling for the following receptor and exposure area combination: benzene, carbon tetrachloride, and ethylbenzene (515 N. Elm Street - future resident only); 1,2-dichloroethane, benzene, ethylbenzene, TCE, and carbon tetrachloride (507 N. Elm Street - future resident only); and PCE (unoccupied areas – future resident only).
- Identifying significant VI risks (≥ 1E-06) or hazards (> 1) – based on modeled trench air concentrations only for current/future utility workers at the 507 N. Elm Street property (driven by potential inhalation of 1,4-dichlorobenzene and benzene).
- Identifying significant potential exposure risks to untreated groundwater from the City of Troy West Wellfield (≥ 1E-06) or hazards (> 1) for any potential receptors based on current plume conditions. (Note: PCE detections in Production Well P-12W have been documented since at least 1986. Furthermore, PCE concentrations in groundwater west of the GMR in the apparent source area, which has been shown to lie within the West Wellfield's 1-year time of travel, have remained relatively consistent over that time. For these reasons, the long-term data do not suggest a likelihood that significantly higher concentrations of PCE will migrate to the West Wellfield in the future).
- Identifying record support for determining that the current measured indoor air concentrations at the 507 N. Elm Street property of 1,2-dichloroethane, benzene, ethylbenzene, and carbon tetrachloride are likely primarily or entirely the result of indoor releases associated with the current commercial/industrial operations (and related stored materials) at this property location, and are unlikely to be significantly related to VI from Site contaminant sources.
- The total risks and hazards calculated under central tendency exposure conditions are about 3 to 10 times lower than those calculated under reasonable maximum exposure (RME) conditions considering the receptor.

Ecological Risk Assessment

EPA conducted a SLERA to evaluate the likelihood that adverse ecological effects are occurring or could occur as a result of site-specific constituent concentrations in environmental media. The SLERA conservatively characterized potential ecological risks associated with the WTCA Site under unremediated conditions at the time of the RI.

Land use throughout the Site and surrounding areas is predominantly developed with residential, community, light/heavy commercial and industrial sites, and City of Troy parkland that are adjacent to the edge of the GMR. Commercial and industrial properties and parkland are the predominant land use throughout the areas associated with the WTCA Site, with the exception of

an approximately 3-acre area of capped open grassland (the former Hobart Lagoon), which is surrounded by mature hardwood trees. Beyond the Site boundary, the other major land use is the aquatic riverine habitat associated with the GMR and Morgan's Ditch. Therefore, this SLERA focused on the riverine habitat associated with the GMR and Morgan's Ditch.

The SLERA identified ecological COPCs to provide a conservative evaluation of the potential for adverse ecological effects related to constituent concentrations in environmental media. This step combines the ecological screening values (ESV) with exposure information to yield an estimate of potential ecological risks at the Site. The SLERA focused on aquatic receptors (fish and invertebrates) for aquatic portions of GMR.

The specific assessment endpoints evaluated in the WTCA Site SLERA are:

- Ensure protection of the benthic and aquatic communities in the GMR and Morgan's Ditch from the deleterious effects of acute and chronic exposures to site-related constituents present in the river.

- Ensure protection of threatened and endangered species (including candidate species) and species of special concern and their habitats from the deleterious effects of acute and chronic exposures to site-related constituents.

EPA used two approaches to evaluate the potential impact of the contaminated groundwater discharges to the aquatic community in the GMR and Morgan's Ditch. First, analytical results from surface water and sediment samples from the GMR and Morgan's Ditch were compared with surface water and sediment ESVs. No VOCs detected in the surface water and sediment exceeded the ESVs. In the second step, results from the groundwater concentrations from monitoring or direct-push wells closest to the GMR were compared with surface water ESVs. The purpose was to identify whether any constituents were present at concentrations that could cause a potential impact to the aquatic receptors in the GMR. Three ecological COPCs were detected; but only one sample from MW-06 with a maximum PCE concentration of 66 ug/L exceeded the surface water ESV of 53 ug/L. This exceedance corresponds to a hazard quotient (HQ) exceeding the EPA threshold value of 1. MW-06 is approximately 100 feet upgradient of Morgan's Ditch and this well is screened at the depth of 55 to 65 feet bgs. The analytical result for sampling at MW-05, downgradient from MW-06 and adjacent to Morgan's Ditch, was below the PCE surface water ESV of 53 ug/L. Data from MW-05 sampling indicates no significant current ecological risks from PCE groundwater discharging to a surface water and, based on the analytical result of one MW-06 sample, a limited potential for future ecological risk from groundwater discharging to surface water.

- Based on the SLERA methodology, aquatic receptors exposed to GMR and Morgan's Ditch surface water are not at risk for adverse effects from Site groundwater discharges at the current time. The SLERA also evaluated groundwater data for the potential additive impacts of maximum concentrations for the wells adjacent to the GMR, and the SLERA did not identify any significant risk.

The response action selected in this ROD is necessary to protect the public health or welfare or the environment. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by a remedial action.

8.0 Remedial Action Objectives

RAOs are specific goals developed to protect human health and the environment based on unacceptable risks calculated in the Site-specific risk assessment. The RAOs provide the basis for developing cleanup options that will be protective of human health and the environment. The RAOs address Site-related receptor and pathway risks and hazard exceedances based on the results of the WTCA Site HHRA, SLERA, and RI. Potential remediation goals (PRGs) were identified by using established cleanup criteria such as MCLs, Regional Screening Levels (RSL), and VISLs.

EPA developed RAOs for the WTCA Site for three categories – groundwater, an affected private well at the 515 N. Elm Street property, and soil VI.

RAOs for Groundwater

EPA developed the following RAOs to address groundwater:

- Restore groundwater to its beneficial use by reducing VOC groundwater contamination associated with the Site to levels at or less than MCLs.
- Prevent potential future residents at the Site from exposure through ingestion, direct contact and inhalation to COCs in groundwater that are above EPA MCLs.
- Prevent potential future commercial/industrial/utility/construction workers at the Site from exposure through ingestion, direct contact and inhalation to COCs in groundwater that are above EPA MCLs.

EPA developed the following PRGs to satisfy the groundwater RAOs. The RI and FS identify PCE as the primary COC of four groundwater COCs at the Site. The PCE groundwater plume encompasses all areas where the other COCs were detected. TCE, benzene, and 1,4-dichlorobenzene are not wide-spread and were only detected in localized areas. EPA and Ohio EPA MCLs are the same for the four groundwater COCs. During the RI VAS program, TCE only exceeded the MCL of 5 µg/L at one location; benzene only exceeded the 5 µg/L MCL in one localized area; and 1,4-dichlorobenzene was not detected above the MCL of 75 µg/L at any location. PCE remediation is therefore the predominant concern for providing groundwater risk reduction at the Site. As a result, remediating the PCE plume to the MCL of 5 µg/L would be the primary PRG for the Site as other COCs would be seen as producing minimal additional cumulative risk.

The PRGs developed for groundwater COCs are based on MCLs as identified below:

- PCE – 5 µg/L
- TCE – 5 µg/L

- Benzene – 5 µg/L
- 1,4-dichlorobenzene – 75 µg/L

RAOs for the Private Well

EPA established the site-wide private well RAO to address actual or potential future risk to human receptors. As a result, EPA developed the following RAO to address the 515 N. Elm Street Apex property private well:

- Prevent current and future occupants of the 515 N. Elm Street property from direct contact, ingestion and inhalation exposure to groundwater contaminated with PCE above the MCL from the existing private well.

The RI and FS identify PCE detected in a private well designated as RW-5 on the 515 N. Elm Street property at a maximum concentration of 10 µg/L. The remedial objective and remedial options considered for the private well are outlined separately from those considered for the overall Site groundwater.

RAOs for Vapor Intrusion

EPA developed the following RAO to address VI:

- Prevent potential exposure to future residents from unacceptable indoor air risk related to Site contaminants of concern via the VI pathway.

EPA developed the following PRGs to satisfy the VI RAO. The PRGs for indoor air COCs are based on the EPA residential air RSLs (the lower of the 1E-05 cancer risk and non-cancer HQ = 1) as identified below:

- PCE – 42 µg/m^3
- TCE - 2.1 µg/m^3.

9.0 Description of Alternatives

CERCLA Section121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with applicable or relevant and appropriate requirements, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable.

EPA developed and evaluated the following cleanup alternatives to address the current and potential risks to human health or the environment at the Site. Estimated timeframes to reach

RAOs for each alternative are based on discussions between Oho EPA, EPA and its contractor regarding historical uses of the technologies at other sites.

Summary of Groundwater Alternatives

EPA developed and evaluated the following remedial alternatives for groundwater for the WTCA Site. (Refer to Figure 5 for the CSM remedial approach layout.) The common element included in each groundwater remedial alternative, GW-1; GW-3A; GW-3B; GW-3C and GW-4, is the City's continuing pre-treatment via air stripping of water obtained from P-12W until RAOs are achieved. EPA considers pre-treatment at P-12W an existing condition and, while not a component of any groundwater remedial alternative, is assumed to continue until groundwater cleanup standards are achieved. In addition, the groundwater remedial alternative GW-2, consisting of ICs in the form of restrictive covenants to ensure long-term protectiveness of groundwater plume areas and Monitoring, was not evaluated individually in the Site Final FS report but is a common element incorporated into groundwater remedial alternatives GW-3A; GW-3B; GW-3C and GW-4. All groundwater alternatives are numbered to correspond to those analyzed in the Final FS report. In identifying the Applicable or Relevant and Appropriate Requirements (ARARs) for each remedy alternative, the substantive provisions (not permitting requirements) of the ARARs apply for work conducted on site.

Groundwater Alternative GW-1: NO ACTION

Estimated Capital Cost: *$0*
Estimated Total O&M Cost: *$0*
Estimated Present Worth Cost: *$0*
Estimated Construction Timeframe: *None*

Regulations governing the Superfund program require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to current and future groundwater contamination at P-12W or the 515 N. Elm Street property private well.

Groundwater Alternatives GW-3A, 3B AND 3C: TARGETED IN-SITU TREATMENT, ICs, AND MONITORING

EPA analyzed three potential targeted in-situ treatments (each of these alternatives also include the addition of ICs and monitoring): Air sparging (AS) and soil vapor extraction (SVE); in-situ chemical oxidation (ISCO); and aerobic bioremediation. The cost estimates for these in-situ treatments were based on a 30 year timeframe. The three groundwater alternatives include periods of both active treatment remediation and monitoring which would allow for the RAOs to be potentially achieved in less than 30 years during the RA and are described below:

Groundwater Alternative GW-3A: TARGETED IN-SITU AS/SVE, ICs, AND MONITORING

Estimated Capital Cost: *$1,450,000*

Estimated Total O&M Cost: *$2,140,000*
Estimated Present Worth Cost: *$4,670,000*
Estimated Construction Timeframe: *6 months*
Estimated Time for Active Remediation: *8 years*
Estimated Time to Achieve RAOs: *20-30 years*

AS/SVE would consist of installing air sparge wells and vapor extraction trenches within targeted treatment areas. Air injected into sparge wells would cause dissolved-phase VOCs to partition from the aqueous to the vapor phase. These vapors would rise through the aquifer into the vadose zone where they would be captured by the SVE system and discharged to the atmosphere. Pre-design investigations and a pilot test would be performed to measure the radius of influence (ROI), determine the flow rates, and measure the mass transfer parameters and geochemical parameters such as dissolved iron. This information would be used to design the air sparge well layout, size AS/SVE equipment, and select monitoring well locations.

Air sparged into groundwater would strip dissolved VOCs, carrying them to the vadose zone for capture via SVE. SVE trenches would convey vapors to a blower through buried piping. The SVE blower and other process equipment (such as the moisture separator) would be housed in a small building. SVE off-gas would vent to the atmosphere through an exhaust stack with or without treatment. Because VOCs are present in groundwater at low concentrations, it is unlikely that off-gas would require treatment. Details such as the number and locations of air sparge wells would be finalized in the remedial design (RD).

Groundwater monitoring would be necessary to monitor and evaluate the effectiveness of the groundwater remedy by demonstrating that groundwater contaminant concentrations have decreased as a result of the remedy and show a continued decrease over time. A network of existing and new groundwater monitoring wells would be used to monitor remedial progress. To estimate groundwater monitoring costs, this remedy alternative assumes installation of up to ten new monitoring wells. This remedy alternative would then use monitoring data to make decisions on the remediation schedule and appropriate adjustments. ICs in the form of legal instruments such as covenants would be required to restrict affected land and groundwater use, and protect the Site remedy until RAOs have been attained.

ARARs for this alternative include the federal Underground Injection Control (UIC) statute, 40 C.F.R. Sections 114-147 for subsurface injection work. Subsurface injection work would also need to comply with the substantive Ohio provisions under O.A.C. 3745-34-06 through 3745-34-09. Other ARARs pertain to emissions from air pollution control equipment under O.A.C 3745-21-09.

Groundwater Alternative GW-3B: TARGETED IN-SITU ISCO, ICs, AND MONITORING

Estimated Capital Cost: *$2,610,000*
Estimated Total O&M Cost: *$2,050,000*
Estimated Present Worth Cost: *$6,060,000*
Estimated Construction Timeframe: *9 months*

Estimated Time for Active Remediation: *6 years*
Estimated Time to Achieve RAOs: *20-30 years*

ISCO treatment consists of delivering a chemical oxidant to the groundwater which then reacts with and destroys the organic contaminants in the groundwater. This groundwater alternative would use injection wells or direct-push injection within the treatment area to deliver the chemical oxidant. The oxidant would likely be ozone or ozone with hydrogen peroxide. Although ozone sparging is the representative process option for this analysis, the decision to use ozone alone or ozone with hydrogen peroxide would be made during the RD based on pilot testing. Transfer tubing would be installed to supply oxidants from process equipment to injection wells; installation of this tubing would require trenching. If ISCO is selected, adequate contact would be achieved by injecting the oxidant within the targeted treatment zone. The ISCO system would also be designed, operated, and monitored to safeguard against VI into existing structures that may put human health at risk.

Given the proximity of Production Well P-12W to the groundwater treatment area, advanced oxidation using hydroxyl free radicals would be the preferred process option for ISCO because other oxidant chemical options such as permanganate and persulfate are more persistent and could result in migration of the oxidant and dissolved solids. Pre-design investigations and a pilot test would be performed to measure ROI, determine the preferred oxidant and dosage, and observe geochemical effects. ISCO can produce a variety of byproducts, which are chemical species that may not be related to the target contaminant, depending on the concentrations of naturally occurring organic matter and various inorganic species. If the ISCO RD pilot test determines a potential for a byproduct to reach the municipal wellfield at a concentration above its tap water screening level, then ISCO would not be used in favor of a different technology.

The entire set of ISCO injection wells would be treated in sequence, targeting one treatment section at a time. The ISCO system may operate one or more months at a time at each section, and the number of times a section is targeted would depend on the extent of contaminant concentration rebound after treatment. ISCO would end when progress becomes asymptotic or when concentrations can be allowed to decline naturally without further treatment. The FS assumes that the ISCO system would operate for approximately 6 years, or an average of one year per section of ISCO injection wells. After ISCO ceases operations, contaminant concentrations would be expected to continue gradually decrease to attain the Site RAOs.

Groundwater monitoring would be used to monitor progress and assess whether additional treatment is appropriate. This approach allows for additional treatment or discontinuation, as appropriate, with the ultimate objective of reducing Site COCs to groundwater RAOs. A network of existing and new groundwater monitoring wells would be used to monitor remedial progress. To estimate cost, it is assumed that up to ten new monitoring wells would be installed. ICs in the form of legal instruments such as covenants would be required to restrict affected land and groundwater use, and protect the Site remedy until RAOs have been attained.

ARARs for this alternative include the federal UIC statute, 40 C.F.R. Sections 114-147 for subsurface injection work. Subsurface injection work would also need to comply with the

substantive Ohio provisions under O.A.C. 3745-34-06 through 3745-34-09. Other ARARs pertain to emissions from air pollution control equipment under O.A.C 3745-21-09.

Groundwater Alternative GW-3C: TARGETED IN-SITU AEROBIC BIOREMEDIATION, ICs, AND MONITORING

Estimated Capital Cost: *$1,710,000*
Estimated Total O&M Cost: *$2,850,000*
Estimated Present Worth Cost: *$5,930,000*
Estimated Construction Timeframe: *Three 3 month events over 3 years*
Estimated Time for Active Remediation: *3 years*
Estimated Time to Achieve RAOs: *20-30 years*

Aerobic bioremediation would involve bioaugmentation and biostimulation. Injections into the groundwater would include aerobic microbial culture, dextrose, and water. Bioaugmentation would involve injection of a proprietary formulation of *Pseudomonas* microorganisms, which are known to cometabolically degrade PCE and less chlorinated ethenes under aerobic conditions. Biostimulation would involve injection of an electron donor (dextrose) and an electron acceptor amendment (such as an oxygen-releasing chemical) to provide a food source and create aerobic conditions. Apart from stimulating aerobic degradation, aerobic conditions would also discourage anaerobic degraders that produce PCE daughter products such as vinyl chloride.

Microbial cultures and amendments could be injected into groundwater via permanent wells or through temporary boreholes. To analyze this alternative, it is assumed that pressurized injections would be performed using temporary boreholes. The number of temporary boreholes or injection points would be verified during the RD. A pre-design investigation and a pilot test would also be performed to gather site-specific information, including ROI and required amendment dosage.

Three injection events would take place and each subsequent event would target a smaller area. Direct-push drilling technology would be used to inject microbes and amendments under pressure. At each location, injection would target multiple vertical intervals below the water table. Injection would commence approximately 15 feet bgs and proceed in 2-foot vertical increments to a total depth of 60 feet bgs. (Targeted depth may vary by location and would be refined during the RD.) First, the electron acceptor amendment would be injected, then the microbes and electron donor would be injected. After injection is complete, the borehole would be plugged and abandoned. The injections would stimulate aerobic degradation of contaminants for 3 to 6 months. PCE would be degraded by the injected microorganisms, and benzene would be degraded by native microorganisms. PCE concentrations are expected to rebound after treatment because of matrix diffusion and desorption. Therefore, additional treatments would be necessary, although the area targeted would be smaller each time. It is assumed that there would be three annual injection events for 3 years, after which residual contaminant concentrations would decline toward groundwater RAOs.

A network of existing and new groundwater monitoring wells would be used to monitor remedial progress. To estimate cost, it is assumed up to ten new wells would be installed. Monitoring data

would be used to make decisions on the remediation schedule including sequencing, remedial progress and termination. ICs in the form of legal instruments such as covenants would be required to restrict affected land and groundwater use, and protect the Site remedy until RAOs have been attained.

ARARs for this alternative include the federal UIC statute, 40 C.F.R. Sections 114-147 for subsurface injection work. Subsurface injection work would also need to comply with the substantive Ohio provisions under O.A.C. 3745-34-06 through 3745-34-09. Other ARARs pertain to emissions from air pollution control equipment under O.A.C 3745-21-09.

Groundwater Alternative GW-4: EXTRACTION, TREATMENT, AND DISCHARGE WITH ICs AND MONITORING
Estimated Capital Cost: *$1,000,000*
Estimated Total O&M Cost: *$2,610,000*
Estimated Present Worth Cost: *$4,620,000*
Estimated Construction Timeframe: *9 months*
Estimated Time for Active Remediation: *30 years*
Estimated Time to Achieve RAOs: *30 years*

Alternative GW-4 would actively remediate the plume using a pump-and-treat system. A pump-and-treat system would involve installing one or more groundwater extraction wells, transfer piping, a treatment system, and a treated water discharge system. To the extent possible, pipelines and wells would be located on public property. Process equipment could potentially be located in the southern portion of the treatment area south of the 507 N. Elm Street property. The number of extraction wells, locations, and flow rates would be determined during the RD. Designing the remedy would require additional groundwater sampling for water quality parameters to evaluate the potential for corrosiveness, precipitate/scale formation, and discharge options. Groundwater modeling would be required to determine the number, locations, and depths of the extraction wells, and to determine the required flow rates to achieve the desired hydraulic capture.

This alternative would target the plume west of the GMR, hydraulically containing and cleaning up groundwater through continuous extraction and treatment. To develop this remedy, the number of extraction wells, locations, and flow rates have been estimated (without modeling) based on RI information only. This remedial alternative assumes installation of four extraction wells pumping at 20 gpm each (80 gpm total).

This remedy alternative identifies air stripping as the representative process option for treating extracted groundwater, although carbon adsorption may also be considered during the RD. Any groundwater treatment would likely be discharged to Morgan's Ditch but other discharge options (such as discharge directly to the GMR) could be evaluated during the RD. Treated water would also require installing transfer piping. Active remediation would be complete when COC concentrations are permanently reduced below groundwater RAOs.

A network of existing and new groundwater monitoring wells would be used to monitor remedial progress. To estimate cost, this remedy alternative assumes up to ten new wells would be

installed. Monitoring data would be used to make decisions on the remediation schedule including sequencing, remedial progress and termination. ICs in the form of legal instruments such as covenants would be required to restrict affected land and groundwater, use and protect the Site remedy until RAOs have been attained.

ARARs for this alternative include the regulation of treated groundwater discharge to surface water under NPDES, 33 USC, §§ 1251-1387, Clean Water Act NPDES Permit Program (40 C.F.R. 122). Federal Water Pollution Control Act, Section 401: Water Quality Certification establishing permit requirements to regulate discharge would potentially be applicable. Groundwater treatment would need to comply with substantive Ohio provisions pertaining to emissions from air pollution control equipment such as air strippers under O.A.C 3745-21-09.

Summary of Private Well Alternatives

All properties on-Site except for the 515 N. Elm Street property are subject to the City of Troy ordinance 913.03 precluding the installation and operation of private drinking water wells within the City, and are required to be connected to the City of Troy municipal water system. For properties located within the City, this private well remedy alternative is the City's ordinance 913.03 and is an IC. Since the City ordinance prohibits private wells within the City (unless such private, auxiliary or emergency water supply, and its method of connection and use of such supply, is first approved in writing by the Director of Public Service and Safety of the City) and the groundwater remedial alternatives include monitoring, no well monitoring remedy alternative is being considered for properties within the City.

The alternatives presented in this section apply only to the private well at the 515 N. Elm Street property. The 515 N. Elm Street property is not located within the City of Troy, is not subject to the City ordinance, and is not subject to the private well remedial alternative for properties in the City. The FS evaluated three remedial alternatives including no action to address the affected private well at the 515 N. Elm Street property. Common elements incorporated into PR-2 and PR-3 are monitoring and ICs in the form of restrictive covenants to ensure long-term protectiveness preventing the construction and operation of a drinking water well on the 515 N. Elm Street property:

Private Well Alternative PR-1: NO ACTION
Estimated Capital Cost: *$0*
Estimated Total O&M Cost: *$0*
Estimated Present Worth Cost: *$0*
Estimated Construction Timeframe: *None*

Regulations governing the Superfund program require that the "no action" alternative be evaluated to establish a baseline for comparison. Under this alternative, EPA would take no action at the Site to prevent exposure to current and future groundwater contamination at the 515 N. Elm Street property private well.

Private Well Alternative PR-2: TREATMENT and MONITORING
Estimated Capital Cost*: $24,000*

***Estimated Total O&M Cost**: $ 18,000*
***Estimated Present Worth Cost**: $55,000*
***Estimated Construction Timeframe**:1 month*
***Estimated Timeframe to Achieve RAOs:** 10 years*

Alternative PR-2 would treat extracted well water using a point of entry (POE) filter prior to any exposure. The filter would be a pre-engineered whole-house filter designed to remove organic contaminants. The filter would be installed inside the building at or near the point of entry. To develop this alternative, the filter is assumed to consist of an activated carbon filter and a sediment filter. To estimate cost, it is assumed that two activated carbon units would be used in series in lead/lag configuration. At any given moment, one unit would be essentially the lead unit and the other would operate as a backup. Treated water would be periodically sampled, and when PCE is detected in the discharge from the lead unit, expended media would be replaced, and the lag unit turned into the lead unit. This process of testing, media changeout and lead/lag switching would continue until the PCE concentration in the private well is below its MCL. Each carbon filter would be sized to require replacement no more than once every 2 years. The sediment filter would be sized to be replaced every 6 months. Influent to the treatment system and effluent from the treatment system would be sampled annually to monitor concentrations and performance. This alternative would not be compatible with groundwater remedial alternatives that alter water quality during remediation. Therefore, Alternative PR-2 would only be used with groundwater remediation Alternatives GW-1 or GW-4. To estimate cost, this remedy alternative assumes that the POE filter would operate for 10 years, within which time groundwater remediation under GW-4 would remediate groundwater near the 515 N. Elm Street property private well.

ARARs for this alternative include the regulation of drinking water under the Safe Drinking Water Act (SDWA) of 1974 40 C.F.R. 141 and 142 establishing MCLs, which are health risk-based standards for public water systems. This alternative also identifies the SDWA of 1974, 40 C.F.R. 143, as a "to-be-considered", establishing welfare-based secondary standards for public water systems.

Private Well Alternative PR-3: CONNECT TO CITY WATER AND ABANDON PRIVATE WELL
***Estimated Capital Cost**: $36,000*
***Estimated Total O&M Cost**: $ 0*
***Estimated Present Worth Cost**: $47,000*
***Estimated Construction Timeframe**:1 month*
***Estimated Timeframe to Achieve RAOs:** 3 years*

Alternative PR-3 involves connecting the building to Troy's public (municipal) water distribution system and abandoning the existing private well. The 515 N. Elm Street property is outside City limits. To implement this alternative, the City would need to annex the area encompassing this property. This alternative assumes that the property owner would agree to annexation. This alternative assumes that the City of Troy would install a new water supply lateral from the City's water main to the 515 N. Elm Street property via horizontal drilling below the street. Connecting the lateral to the main would involve work in a right-of-way, requiring a

permit and traffic control. Soil would be excavated to access the lateral, the lateral would be connected to the main, then the excavation would be backfilled and restored to existing conditions. On the 515 N. Elm Street property, the private well would be plugged and abandoned and the new lateral would be connected to the supply pipe to the property. A new meter would be installed to monitor usage. It is estimated that the Alternative PR-3 remedy action would take approximately 3 years to complete. The private well at 515 N. Elm Street is used for a bathroom and is not a source of drinking water on the property. The property has historically utilized bottled water as a source of drinking water and would continue to do so until a municipal water supply from the City of Troy was installed and the private well abandoned.

ARARs for this alternative include the regulation of drinking water under the SDWA of 1974, 40 C.F.R. 141 and 142 establishing MCLs, which are health risk-based standards for public water systems. This alternative also identifies the SDWA of 1974, 40 C.F.R. 143, as a "to-be-considered", establishing welfare-based secondary standards for public water systems.

Summary of Vapor Intrusion Alternatives

The RI/FS did not identify any current VI risk. There are no residential buildings on Site, nor are there current plans for such buildings. As a result, developing alternatives involving engineering controls to mitigate current VI risk is not appropriate. Alternatives for VI are intended to address potential VI associated with future hypothetical residential use of the Site. Therefore, the VI remedial alternatives evaluated for the WTCA Site include: 1) no action and 2) ICs and monitoring. An analysis of these alternatives is presented below.

Vapor Intrusion Alternative VI-1: NO ACTION

Estimated Capital Cost: *$0*
Estimated Total O&M Cost: *$0*
Estimated Present Worth Cost: *$0*
Estimated Construction Timeframe: *None*

Regulations governing the Superfund program require that the "no action" alternative be evaluated to establish a baseline for comparison. Under Alternative VI-1, no action would be taken to address potential future VI at the Site.

Vapor Intrusion Alternative VI-2: ICs AND MONITORING

Estimated Capital Cost*: $44,000*
Estimated Total O&M Cost*: $ 37,000*
Estimated Present Worth Cost*: $105,000*
Estimated Construction Timeframe*: 2 months*
Estimated Timeframe to Achieve RAOs: *5 years*

Alternative VI-2 would use ICs to restrict groundwater and property use, and require VI monitoring if buildings are constructed for residential use in contaminated areas. Future developers would be responsible for VI monitoring and any VI mitigation if necessary. This

alternative requires ICs in the form of legal instruments such as covenants to restrict affected land and groundwater use, and protect the Site remedy. Capital costs and O&M costs listed relate to implementing ICs and VI monitoring of Site properties under current conditions. General Site monitoring, inspections and reporting would take place to evaluate compliance with ICs. It is estimated that the Alternative VI-2 remedy would take approximately 5 years to complete.

10.0 Comparative Analysis of Alternatives

Section 121(b) (1) of CERCLA identifies several factors that EPA is required to consider in its assessment of remedial alternatives. Building on these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies offering the most effective and efficient means of achieving site remediation goals. While all of the nine criteria are important, they are weighed differently in the decision making process depending on whether they evaluate protection of human health and the environment or compliance with federal and State requirements, standards, and criteria (threshold); consider technical or economic merits (balancing criteria); or involve evaluation from the State and the public that may influence the final remedy selection (modifying criteria). Each of these nine criteria is described below.

Threshold Criteria

1. **Overall Protection of Human Health and the Environment** focuses on how an alternative achieves protection over time and indicates how each source of contamination would be minimized, reduced, or controlled through treatment, engineering, or institutional controls. The evaluation of the degree of overall protection associated with each alternative is based largely on the exposure pathways and scenarios set forth in the baseline human health risk assessment.
2. **Compliance with ARARs** addresses whether alternatives meet applicable or relevant and appropriate federal and State requirements.

Balancing Criteria

3. **Long Term Effectiveness and Permanence** addresses the results of a remedial action in terms of the risk remaining at the Site after response objectives have been met.
4. **Reduction of Toxicity, Mobility or Volume through Treatment** addresses the statutory requirement for selecting remedial actions that employ treatment technologies that reduce the toxicity, mobility or volume of the hazardous constituents present in the impacted media to the maximum extent practicable.
5. **Short-Term Effectiveness** addresses the effects of the alternatives during the construction and implementation phases (i.e. remediation risks) until the remedial action objectives are met.

6. **Implementability** considers the technical and administrative feasibility of implementing the remedial alternative, including factors such as the relative availability of goods and services.
7. **Cost** includes estimated capital, annual O&M costs, and net present value of capital and O&M costs including long term monitoring.

Modifying Criteria

8. **State Agency Acceptance** considers whether the State support Agency concurs with the selected remedy for the Site.
9. **Community Acceptance** addresses the public's general response to the remedial alternatives and the preferred alternative presented in the Proposed Plan.

Each of the nine evaluation criteria are discussed below with respect to the alternatives under consideration for this WTCA Site remedial action. The relative performance of each alternative for remediating the groundwater plume and the private property well is evaluated against the nine criteria, noting how it compares to the other options under consideration. Soil vapor alternative VI-2 is not evaluated below because a comparative evaluation is not necessary when only one active alternative exists and the other is the "no action" alternative. A more detailed analysis of each of the remedial alternatives can be found in the FS Report.

10.1 Overall Protection of Human Health and the Environment

Groundwater Alternative GW-1 (no action) and Private Well Alternative PW-1 (no action) would provide no risk reduction and would not be protective of human health or the environment. Because Alternatives GW-1 and PW-1 do not pass this threshold criterion, they are not discussed further in this Proposed Plan. As a result, Groundwater Alternatives GW-3A (AS/SVE), GW-3B (ISCO), GW-3C (Aerobic Bioremediation), and GW-4 (Pump-and-Treat) will be analyzed; and Private Well Alternatives PW-2 (Treatment and Monitoring), and PW-3 (Connect to City Water and Abandon Private Well) will be analyzed.

The persistence of the low-concentration contaminant plume is attributed to mass transfer from low-permeability soils. Therefore, treating groundwater associated with these low-permeability soils is essential to achieving cleanup. While all alternatives would perform equally well in permeable soils, injection via direct-push techniques offers better access to contamination in low-permeability soils. Therefore, Alternative GW-3C is expected to deplete more contaminant mass from low-permeability soils than other alternatives, increasing the likelihood of cleaning up groundwater within a reasonable timeframe with controllable risk to the public and workers during implementation.

Groundwater Alternative GW-3B would also destroy contaminants in place but would likely deplete less contaminant mass in low-permeability soils than Alternative GW-3C. This is because Alternative GW-3B, using sparging, would not distribute the ozone in groundwater as effectively. Alternative GW-3C uses direct-push pressurized injections into discrete vertical

intervals to distribute bioremediation amendments. In relation to Alternative GW-3C, Alternative GW-3B entails comparable risk to the public and workers during implementation, although controls to mitigate risk from the use of ozone would be slightly more specialized for Alternative GW-3B.

Alternatives GW-3A and GW-4 would pose minimal risk to the public or the environment during treatment but may not treat low-permeability zones where the contaminant mass sustaining the plume is presumed to reside. Therefore, these alternatives are not as likely to achieve groundwater cleanup standards in a reasonable time. Both Alternatives GW-3A (which involves air sparging) and GW-4 (which involves groundwater extraction) would preferentially remediate high-permeability soils.

Alternatives GW-3A, GW-3B, GW-3C, and GW-4 would all have a similar level of protectiveness afforded by ICs and monitoring.

Private Well Alternatives PR-2 and PR-3 would be protective because they would both reduce the potential for occupants to ingest contaminated well water. Alternative PR-3 would be more protective because it provides a permanent solution whereas Alternative PR-2 would require ongoing maintenance and monitoring to ensure its protectiveness.

10.2 Compliance with ARARs

Groundwater Alternatives GW-3A, GW-3B, GW-3C, and GW-4 would all comply with ARARs. GW-3A, GW-3B and GW-3C would require compliance with UIC regulations since all require subsurface injection work. These ARARs would include the substantive provisions under O.A.C. 3745-34-06 through 3745-34-09. GW-4 would require compliance with Clean Water Act NPDES Permit Program regulations for discharge of treated groundwater to surface water. Groundwater treatment would need to comply with substantive provisions under O.A.C 3745-21-09 pertaining to emissions from air pollution control equipment such as air strippers.

Private Well Alternatives PR-2 and PR-3 would also comply with ARARs. PR-2 and PR-3 would comply with regulations of drinking water under the Safe Drinking Water Act by meeting established MCLs and welfare-based secondary standards, which are health risk-based standards for public water systems.

10.3 Long-Term Effectiveness and Permanence

Groundwater Alternatives GW-3B and GW-3C are most likely to significantly reduce contaminant mass in low-permeability soils. Although these alternatives would be accompanied by geochemical effects (such as changes to pH and oxidation-reduction potential, or formation of byproducts and intermediates), these effects are expected to be localized and temporary and would not negatively affect the municipal wellfield.

Amendment injections in Alternative GW-3C would also cause minor plume dilution. If the volume of amendments injected per event is less than 10 percent of the pore volume of the targeted treatment area, the resulting dilution of COC concentrations within this area would be

less than 9 percent (because plume volume would increase by 10 percent but COC mass would not change). Plume dilution would be controlled by limiting amendment injection volume to 10 percent of the target pore volume per injection event.

Alternative GW-3A, which employs air sparging and SVE, would produce minimal geochemical changes (such as increasing dissolved oxygen concentration) and would have the lowest potential to negatively affect the municipal wells. However, this alternative would be less effective in remediating low-permeability soil than GW-3B and GW-3C. For air sparging to remediate groundwater, it must strip and recover dissolved contaminants, and air must be sparged below the contaminated zone. Even if the sparged air did migrate through low-permeability soils, it would follow preferential pathways, leaving substantial portions of the aquifer untreated. Furthermore, the low-permeability vadose zone would make it difficult to recover stripped contaminants. Therefore, some fraction of stripped contamination would not be recovered and would return to the dissolved phase.

Alternative GW-3B, which sparges ozone, has similar challenges except that the sparged gas need not be recovered. Even if sparging produces preferential pathways in low-permeability soil, dissolved ozone could migrate outward from these pathways into contaminated soil, destroying contaminants in place. In that respect, ozone sparging would be more effective than air sparging, although not as effective as pressurized injection of liquid amendments via direct-push technology, because the latter method utilized in Alternative GW-3C would be performed on a denser three-dimensional injection grid allowing better access to contamination.

Alternative GW-4 would preferentially draw groundwater from more permeable soil with minimal effect on low-permeability soil where much of the contaminant mass is likely to reside. Therefore, contaminants trapped in low-permeability soils would diffuse into areas increasing contaminant concentrations and making it less likely that groundwater could be cleaned up in a reasonable timeframe.

Private Well Alternative PR-3 would provide a permanent solution whereas Alternative PR-2 would require ongoing long-term maintenance and monitoring. Therefore, Alternative PR-3 would be more effective over the long term than Alternative PR-2.

10.4 Reduction of Toxicity, Mobility or Volume

This criterion is meant to evaluate alternatives against the statutory preference for treatment. Groundwater Alternatives GW-3B and GW-3C would destroy contaminants in place, reducing toxicity and volume through treatment. Alternatives GW-3A and GW-4 would likely not destroy contaminants because low mass transfer rates from liquid to gas would allow contaminants to be discharged to the atmosphere without treatment. Therefore, Alternatives GW-3A and GW-4 would not reduce toxicity or volume through treatment. Although Alternative GW-4 would reduce the mobility of contaminants through hydraulic containment, it would not reduce mobility through treatment. None of the alternatives would decrease contaminant mobility through treatment.

Although Alternative GW-3C would not increase contaminant mobility, it would displace contaminated groundwater. Subsurface injection of liquid amendments would displace groundwater as the amendments are forced into saturated pore space. The volume of groundwater displaced would be equal to the volume of amendments injected. Assuming the volume of amendments injected during an event is less than 10 percent of the pore volume of the target zone, less than 10 percent of the groundwater would be displaced. Alternatives GW-3A and GW-3B would also displace groundwater as air or ozone is sparged, but this typically manifests as groundwater mounding. That is, sparging would mostly displace groundwater vertically with only minor displacement horizontally. Alternatives GW-3A and GW-4 would increase contaminant mobility by transferring it to the gaseous phase and discharging it without treatment, but this would pose no significant risk. Alternative GW-3B would not increase contaminant mobility.

Private Well Alternative PR-3 would not reduce toxicity, mobility, or volume through treatment. Alternative PR-2 would reduce contaminant mobility through sorption to filtration media.

10.5 Short-Term Effectiveness

Groundwater Alternatives GW-3A and GW-3B involve comparable physical hazards to workers from drilling, earthwork, mechanical, and electrical work during construction. Alternative GW-4 would involve fewer physical hazards because it includes less infrastructure, and Alternative GW-3C would involve fewer physical hazards because it does not include permanent infrastructure. Alternatives GW-3A and GW-4 would involve no risk of worker exposure to hazardous remediation chemicals during construction, while Alternatives GW-3B and GW-3C would involve some risk of worker exposure to hazardous remediation chemicals during construction and remediation. Alternatives GW-3A, GW-3B, and GW-4 would not pose any chemical hazards to the public during construction. Alternative GW-3C would pose some chemical hazards to the public during construction and remediation if hazardous oxygen-releasing chemicals, such as calcium peroxide, are accidentally spilled during transport to the Site. Alternatives GW-3A and GW-4 would release VOCs to the atmosphere during their active remedial timeframes, but this would not pose significant risk to the community during operation. Alternative GW-3B would pose controllable ozone intrusion risk to occupants of buildings on site during the active remedial timeframe. Alternative GW-3C would pose no equivalent air pollution or intrusion risk during its active remedial timeframe.

Private Well Alternative PR-2 would be more effective than Alternative PR-3 over the short-term because it is less complex to construct and would result in a lower risk of injury to workers during the implementation process.

10.6 Implementability

Groundwater Alternative GW-4 would be easy to construct and would involve installation of a few groundwater extraction wells, associated piping and a treatment system. However, Alternative GW-4 would require operation and maintenance for 30 years or more, along with groundwater monitoring. Alternative GW-3C, which includes no permanent infrastructure, would require drilling a large number of boreholes, injecting bioremediation amendments into

those boreholes, then plugging the boreholes. The primary challenges with Alternative GW-3C would be avoiding underground utilities and minimizing surfacing of amendments during injections. These injection activities would be repeated two more times over a period of 3 years. Alternative GW-3C would not involve long-term field activities other than long-term groundwater monitoring. Although GW-3C may be implemented using permanent remediation wells, permanent wells were not the representative process option for the FS and would be evaluated during the RD if necessary. Alternatives GW-3A and GW-3B are more complex to construct because they require a significant amount of permanent infrastructure including several remediation wells, associated piping, and process equipment. Constructing these alternatives would involve more earthwork (because of large quantities of buried piping) and more maintenance (because of the many electrical and mechanical components including motors, blowers, valves and controls) than any other alternative. Both alternatives GW-3A and GW-3B would require operation and maintenance for 6 to 8 years along with long-term groundwater monitoring.

Private Well Alternative PR-2 would be easier to implement than Alternative PR-3 because PR-3 would have significantly more administrative obstacles. For example, the 515 N. Elm Street property is just north of the Troy city limits and the city would have to annexed before the property would be eligible for municipal water service.

10.7 Cost

The present worth costs based on the use of a 7% discount factor for the four groundwater alternatives, from highest to lowest, are as follows:
(1) Alternative GW-3B is $6.06 million; (2) Alternative GW-3C is $5.93 million; (3) Alternative GW-3A is $4.67 million; and (4) Alternative GW-4 is $4.62 million.

The present worth costs for the private well alternatives, from highest to lowest, are as follows:
(1) Alternative PR-2 is $55,000, (3) Alternative PR-3 is $47,000.

The present worth cost the vapor intrusion alternative VI-2 is $105,000.

10.8 State Acceptance

Ohio EPA supports the selected remedy: Groundwater Alternative GW-3C; Private Well Alternative PR-3; and Vapor Intrusion Alternative VI-2 . EPA received an August 18, 2020 letter from the Director of Ohio EPA expressing concurrence with the selected remedy.

10.9 Community Acceptance

During the virtual public meeting and public comment period, the community expressed support for the preferred Site remedy including alternatives GW-3C, PR-3, and VI-2 during the question and answer session. EPA did not receive any formal public comments during the virtual public meeting or during the public comment period. This is noted in the Responsiveness Summary which is Part III of this ROD.

11.0 Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a Site, wherever practical. The principal threat concept is applied to the characterization of "source material" at a Superfund Site. Source material includes or contains hazardous substances, pollutants or contaminants that act as a source for migration of contaminants to groundwater, surface water or air, or acts as a source for direct exposure. EPA has defined principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

There is no principal threat soil waste on the Site. In 1992, Ohio EPA conducted a removal action of four USTs at a commercial property on the Site. Ohio EPA also conducted a soil investigation due to one of the USTs being damaged. EPA followed this up in 2015 with RI activities that included a multi-phase soil gas and soil boring sampling program at and near the former Ohio EPA removal action locations. Soil sample analytical results from the EPA RI document that the VOCs detected in Site soils were below residential and industrial direct contact screening levels. Groundwater contamination at the Site is likely as result of residual contamination from a release at or before the time of the 1992 Ohio EPA removal action.

12.0 Selected Remedy

EPA has selected the Site remedy Groundwater Alternative GW-3C (Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring); Private Well Alternative PR-3 (Connect to City of Troy Municipal Water and Abandon the Private Well); and Vapor Intrusion Alternative VI-2 (ICs and Monitoring).

12.1 Summary of the Rationale for the Selected Remedy

The Selected Remedial Cleanup Alternative to address the WTCA Site groundwater contamination, potential associated vapors, and the affected private well at the 515 N. Elm Street property is a combination of Groundwater Alternative GW-3C (Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring); Private Well Alternative PR-3 (Connect to City Water and Abandon the Private Well); and Vapor Alternative VI-2 (ICs and Monitoring). The total estimated cost of the Selected Remedial Alternative is approximately $6 million. The estimated timeframe to reach RAOs for the Site groundwater contamination is approximately 20 years. The estimated timeframe to achieve RAOs for the affected 515 N. Elm Street property private well is estimated to be three years or less. The property owner, the City of Troy, Ohio EPA and EPA are in agreement that connecting to City of Troy municipal water is the preferred alternative for the affected private well.

During implementation of Groundwater Alternative GW-3C, groundwater quality will be monitored throughout the WTCA Site to evaluate the effectiveness of the overall Site remedy,

including the targeted in-situ groundwater treatment areas within the groundwater plume. Monitoring is also intended to address any potential VI associated with future hypothetical residential use of the Site, since there is no current VI risk.

The selected remedy was preferred over other alternatives because it is expected to achieve substantial risk and mass reduction through targeted in-situ treatment of hot spot areas of groundwater contamination. The selected remedy would also prevent exposure to, and reduce migration of, contaminants from soil to groundwater. The persistence of the low-concentration contaminant plume is attributed to mass transfer from low-permeability soils. Therefore, treating groundwater associated with these low-permeability soils is essential to achieving cleanup. The Selected Groundwater Alternative is expected to deplete more contaminant mass from low-permeability soils than other alternatives, increasing the likelihood of cleaning up groundwater within a shorter or reasonable timeframe at a reasonable cost with controllable risk to the public and workers during implementation.

Based on the information available, the selected remedy satisfies the following statutory requirements of CERCLA 121(b): it is protective of human health and the environment, complies with ARARs, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy all complies with the statutory preference for the selecting a remedy that involves treatment as a principal element.

12.2 Description of Remedial Components

The Site remedy components include Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring for Groundwater; Connection to City of Troy Municipal Water and Abandonment of the Private Well at the affected commercial property; and ICs and Monitoring for potential future VI.

Aerobic bioremediation involves targeted injection of proprietary bacteria formulations into groundwater accompanied by introduction of an organic carbon food source such as dextrose. Injections into groundwater will be done through boreholes or permanent wells. These microbe formulations will require periodic reinjection over time in order to achieve remediation goals. Aerobic conditions will need to be maintained for these microbes to thrive and degrade the target contaminants at the Site. Implementation of ICs on affected land and groundwater use will provide restrictions to protect the remedy until RAOs are achieved. Monitoring will provide the ongoing data needed to assess the progress of the Site remedy.

Connecting the 515 N. Elm Street private well to the City of Troy municipal water supply will provide a safe permanent alternate water supply. The abandonment of the existing private groundwater well at the property will eliminate any risk of accessing contaminated water from the affected aquifer at the property. The 515 N. Elm Street private well is used for a bathroom and is not a source of drinking water on the property. The property has historically utilized bottled water as a source of drinking water and will continue to do so until it is connected to the City of Troy municipal water supply.

Since there was no current elevated VI risk at the Site, ICs and monitoring will assure that there was no future elevated VI risk at the Site during the remedy.

12.3 Summary of the Estimated Remedy Costs

The estimated present worth cost for the selected remedy is $6,082,000. The principal elements of the remedy costs for each component of the remedy include capital cost and O&M, with the exception of the private well component that does not require O&M after well abandonment. It is estimated that the Groundwater Remedy component will have a capital cost of $1,710,000 and an O&M cost of $2,850,000; the Private Well Remedy component will have an estimated cost of $36,000; and the VI Remedy component will have an estimated capital cost of $44,000 and O&M cost of $37,000.

12.4 Expected Outcomes of the Selected Remedy

The selected remedy will protect human health and the environment under current and reasonably anticipated future property uses at the Site by containing and treating the groundwater plume; providing a public water supply to an affected Site property while abandoning use of a private groundwater well; and implementing ICs on affected land and groundwater use until RAOs are achieved. Site monitoring combined with ICs will provide the ongoing data needed to assess the progress of the selected remedy and assure there is no elevated future VI risk to workers/residents. It is estimated that RAOs for the Site Private Well Remedy will be achieved in 3 years; RAOs for the Site VI Remedy will be achieved in 5 years; and RAOs for the Site Groundwater Remedy will be achieved in 20-30 years.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead Agency must select remedies that are protective of human health and the environment, attain federal and state requirements that are applicable or relevant and appropriate for this remedial action (or invoke an appropriate waiver), are cost effective, and utilize permanent solutions to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous wastes as a principal element and a bias against off-Site disposal of untreated wastes. The following sections discuss how the selected remedy addresses these statutory requirements.

13.1 Protection of Human Health and the Environment

The selected remedy will be protective of human health and the environment for the risks associated with the Site. Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring will be protective of human health and the environment for groundwater risks. Bioremediation treatment focusing on targeted groundwater hotspots will provide a reduction in contamination levels and the opportunity to reach groundwater RAOs over the long-term. Implementation of ICs and monitoring will provide restrictions to protect human health, the environment, and the remedy.

Connection to City of Troy municipal water and abandonment of the 515 N. Elm Street property private well will provide long-term protection of human health and the environment by eliminating a potential source of contaminated groundwater.

Monitoring for potential future elevated VI risk with ICs will assure that Site related groundwater contaminants do not migrate from groundwater to the subsurface and into indoor air to prevent a future VI threat to human health.

13.2 Compliance with ARARs

The selected remedy is expected to comply with the state and federal ARARs that are specific to the scope of this remedy action. The ARARs for this remedial action are discussed in Section 10.2 above.

13.3 Cost-effectiveness

EPA has determined that the selected remedy is cost effective, will be protective and represents a reasonable level of protectiveness for the money to be spent. In making this determination, the following definition was used: "[a] remedy shall be cost effective if its costs are proportional to the overall effectiveness." (40 C.F.R. 300.430(f)(1)(ii)(D)). "Overall effectiveness" was evaluated by assessing three of the five balancing criteria (long term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, and short-term effectiveness). Overall effectiveness was then compared to cost to determine cost-effectiveness. The relationship to the overall effectiveness of this remedial action was determined to be proportional to its costs; therefore, the remedy represents a reasonable level of protectiveness for the money spent. The estimated present worth of the selected remedy is $6,082,000.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The selected remedy uses permanent solutions and treatment to the maximum extent practicable. EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site in order to meet Site RAOs over the long-term.

Connection to City of Troy municipal water and abandonment of the 515 N. Elm Street property private well will provide a permanent solution by eliminating a potential source of contaminated groundwater.

Monitoring for future elevated VI risk until Site RAOs are achieved will provide a permanent solution of assuring that Site workers/residents are not at risk of potential elevated VI.

13.5 Preference for Treatment as a Principal Element

By treating the Site groundwater contamination through targeted in-situ bioremediation, the selected remedy satisfies the statutory preference for remedies that employ treatment as a principal element.

13.6 Five-Year Review Requirements

CERCLA §121(c) and the NCP §300.430(f)(5)(iii)(C) provide the statutory and legal bases for conducting Five-Year Reviews. This remedy is expected to result in hazardous substances remaining at the Site in the groundwater above levels that allow for UU/UE until RAOs are achieved. As a result, statutory reviews will be conducted every five years after commencement of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment until the RAOs are achieved.

14.0 Documentation of Significant Changes

The Proposed Plan for this Site identified a combination of Groundwater Alternative GW-3C (Targeted In-Situ Aerobic Bioremediation, ICs, and Monitoring); Private Well Alternative PR-3 (Connect to City of Troy Municipal Water and Abandon the Private Well); and Vapor Intrusion Alternative VI-2 (ICs and Monitoring) as the preferred remedial action. The Proposed Plan comment period ran from June 15, 2020 to July 14, 2020. CERCLA Section 117(b) and the NCP at 300.430(f)(5)(iii) require an explanation of significant changes from the remedy presented in the Proposed Plan that was published for public comment. Since no written or verbal comments were submitted during the public comment period, EPA determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

Part III: Responsiveness Summary

This Responsiveness Summary documents public participation in the remedy selection process for the WTCA Site. Comments received during the 30-day public comment period and during the June 24, 2020 virtual public meeting are included in this section of the ROD, along with EPA's responses to these comments. The public comment period for this response action ran from June 15, 2020 to July 14, 2020.

EPA did not receive any public comments during the June 24, 2020 virtual public meeting or during the public comment period from June 15 – July 14, 2020. General questions from the public regarding the Site were answered during this public comment period and support was expressed for the preferred Site remedy.

Figures

Figure 1: Site Location Map

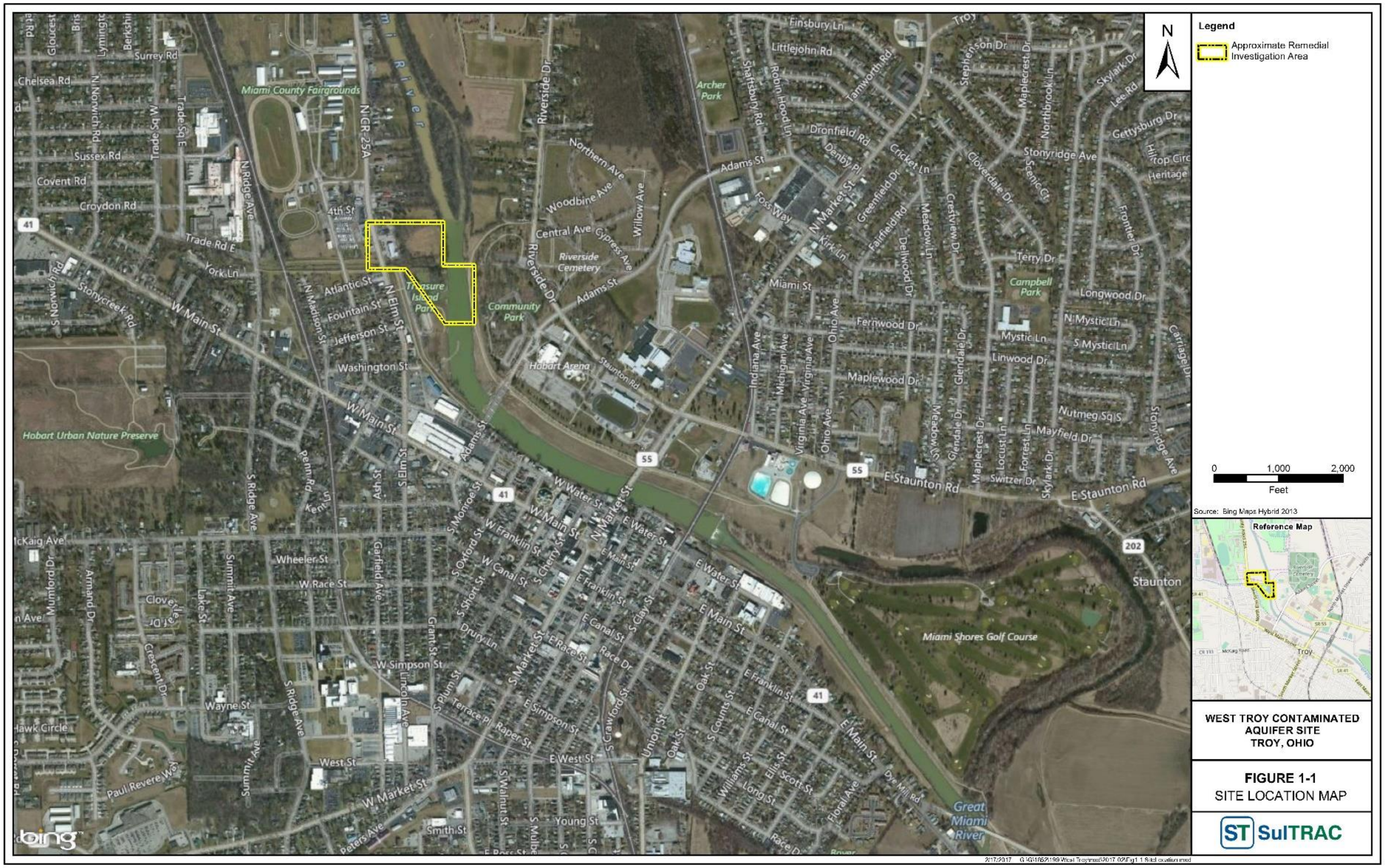


Figure 2: City of Troy Wellfield Location Map

Figure 3: Site Groundwater VAS Results for PCE

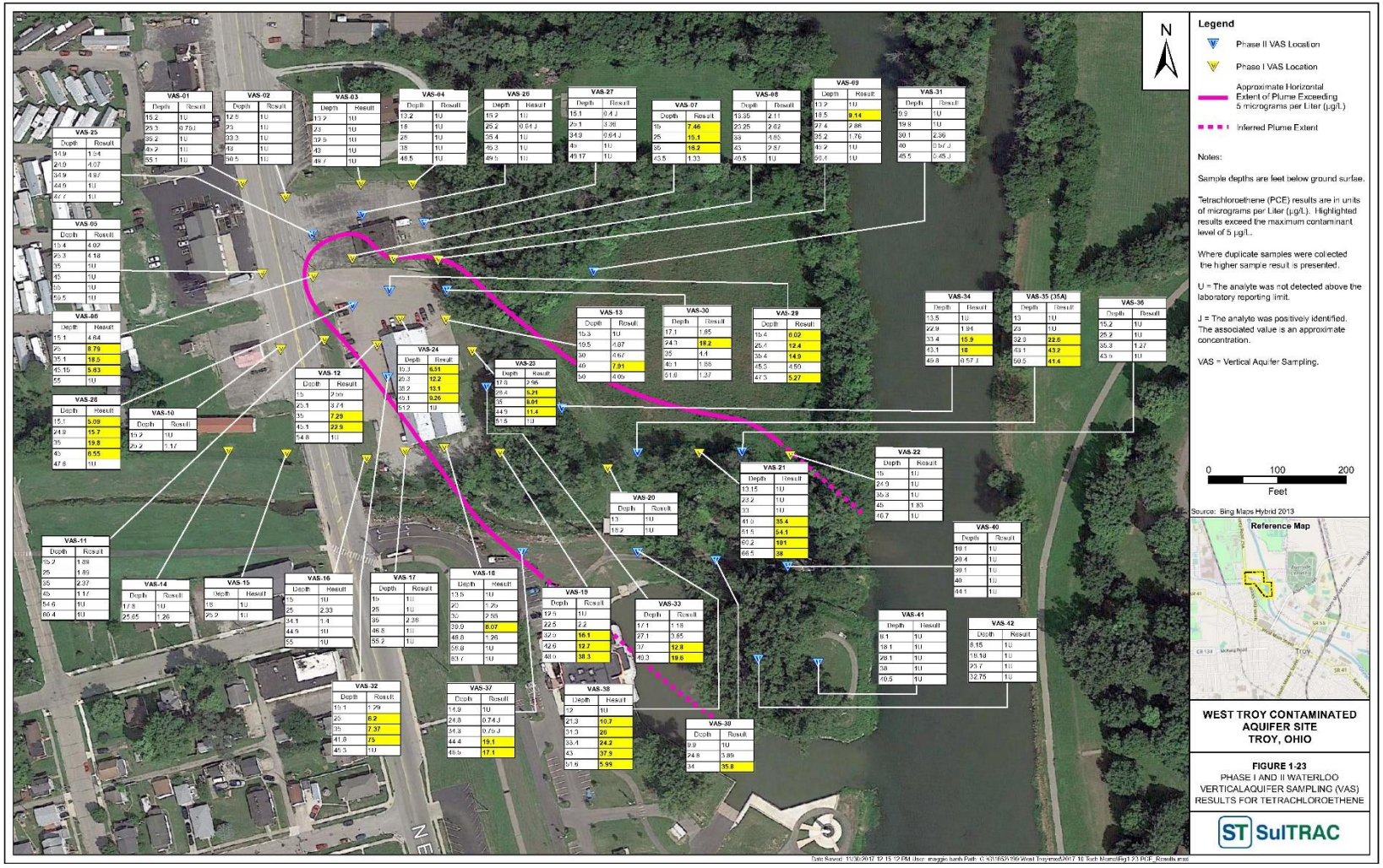


Figure 4: Site Estimated Groundwater Plume Map

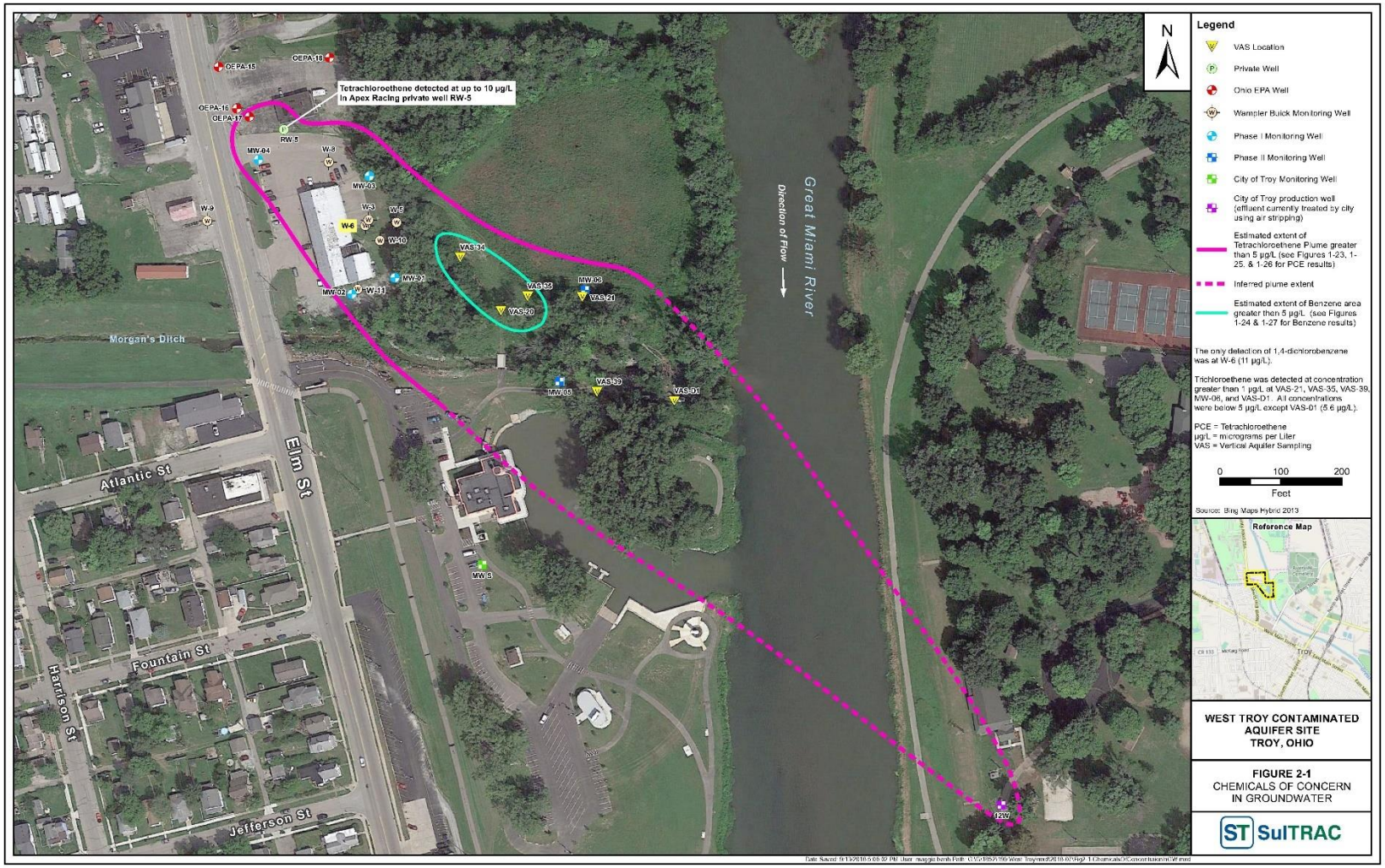


Figure 5: CSM Layout of Remedial Approach Map

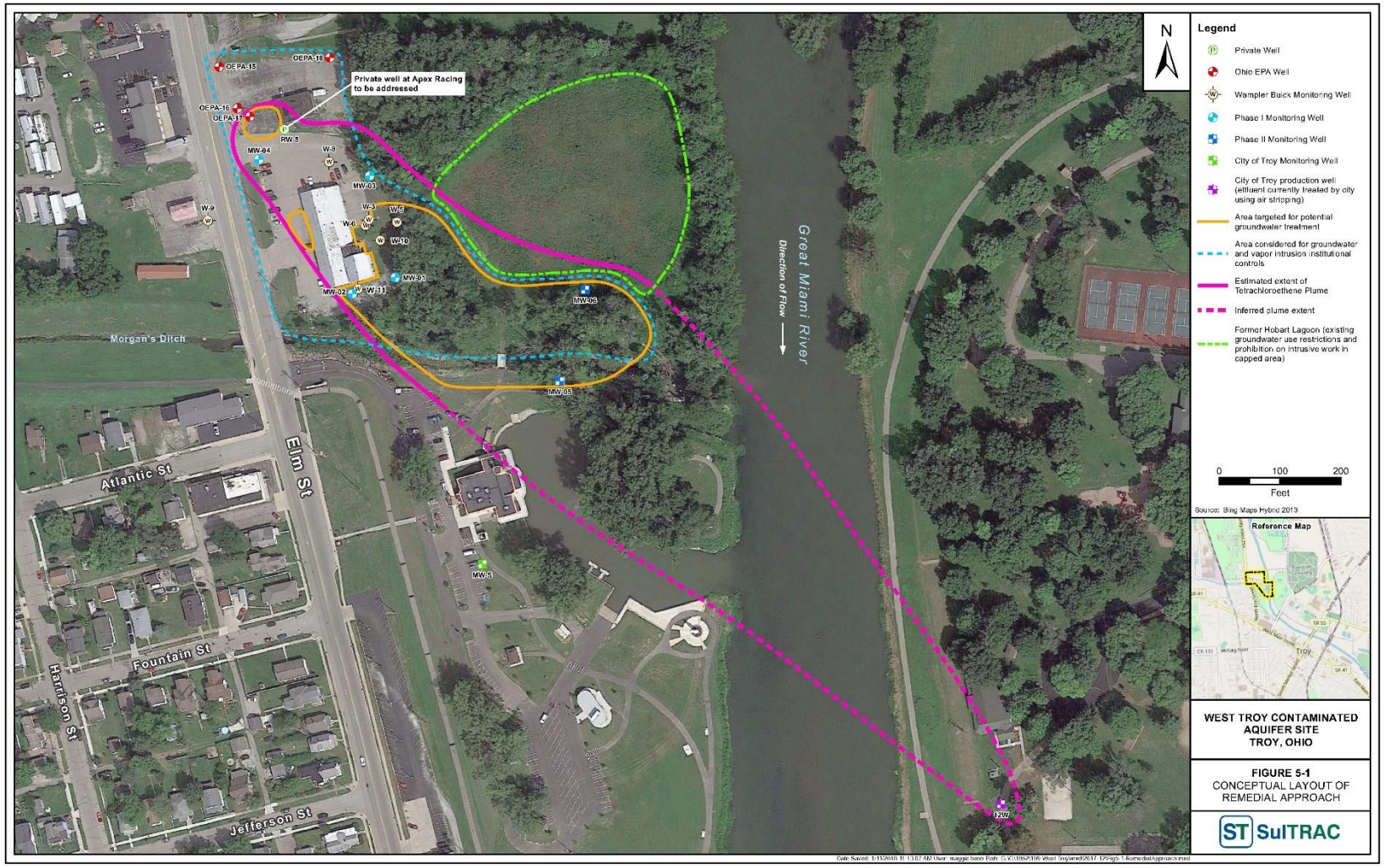


Figure 6: Human Health CSM

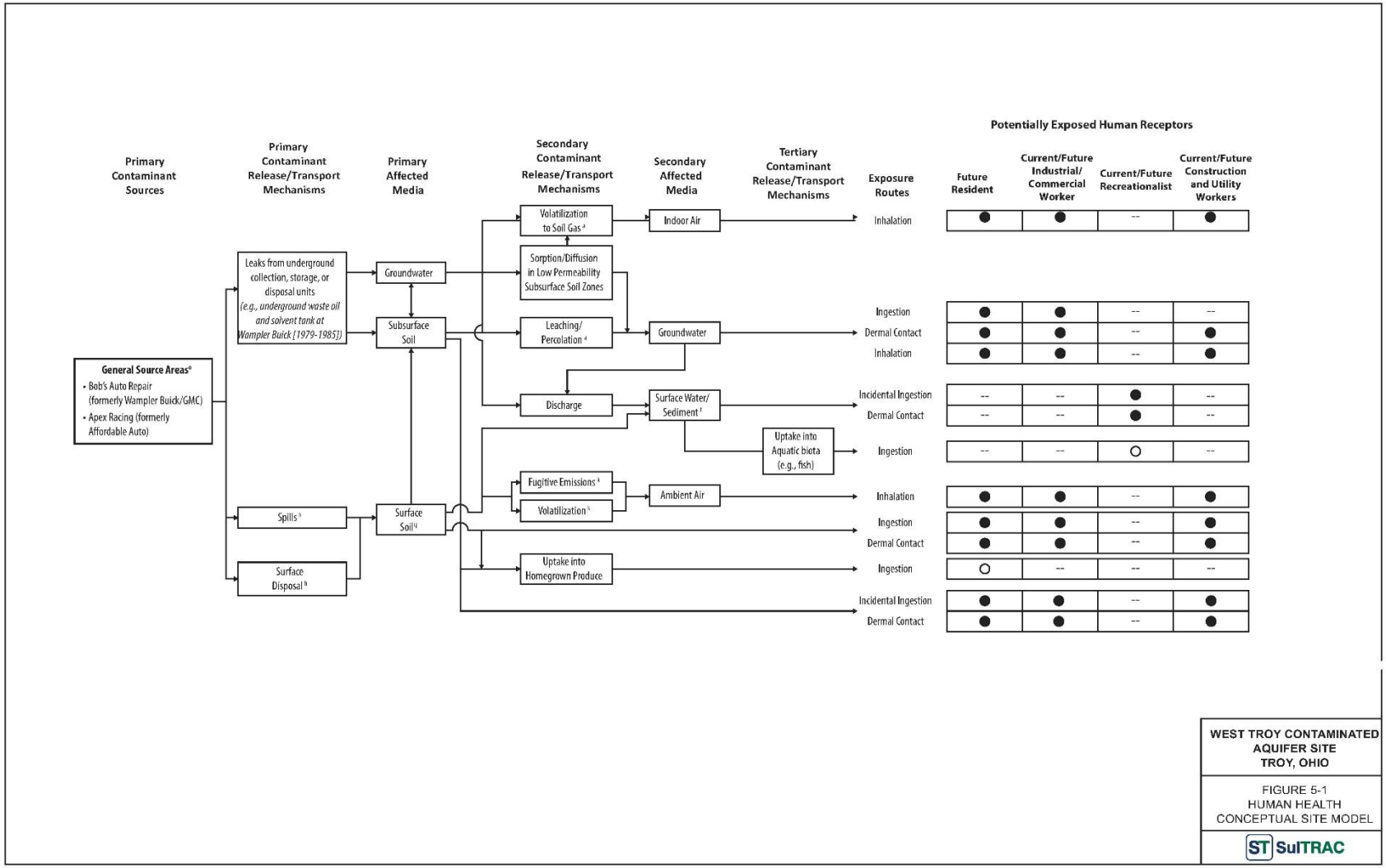
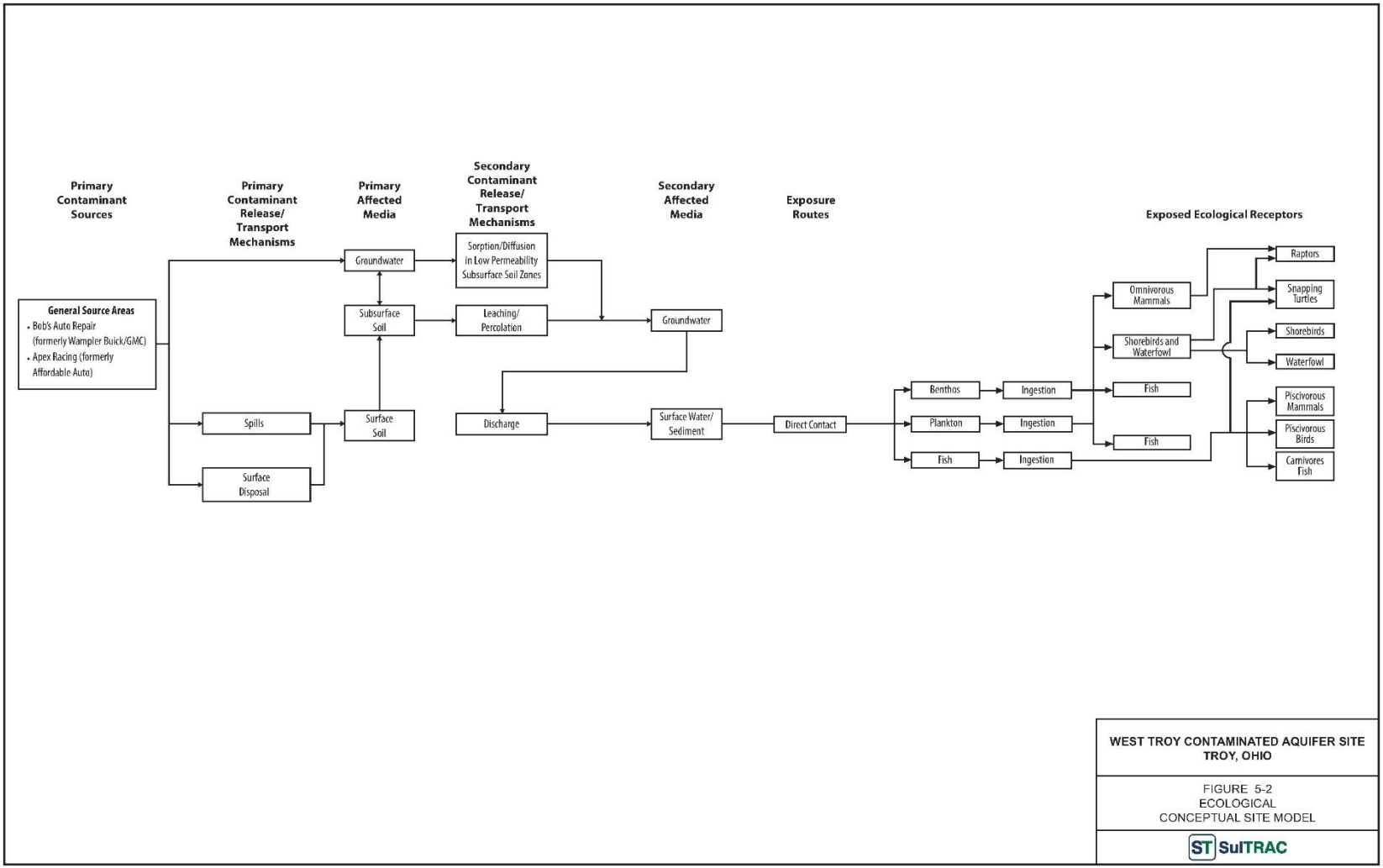


Figure 7: Ecological CSM



Tables

Table 1: 2016-2018 Results for P-12W (Troy West Wellfield)

Well	Date	PCE (µg/L)	TCE (µg/L)	cis-DCE (µg/L)
P-4W	7/12/18	ND	ND	ND
	6/7/18	ND	ND	ND
	5/16/18	ND	ND	ND
	4/16/18	ND	ND	ND
	3/15/18*	ND	ND	ND
	2/15/18	ND	ND	ND
	11/9/17	ND	ND	ND
	10/19/17	ND	ND	ND
	9/7/17	ND	ND	ND
	8/10/17	ND	ND	ND
	7/5/17	ND	ND	ND
	6/8/17	ND	ND	ND
	5/4/17	ND	ND	ND
	4/5/17	ND	ND	ND
	3/19/17	ND	ND	ND
	2/9/17	ND	ND	ND
	1/12/17	ND	ND	ND
	12/8/16	ND	ND	ND
	11/10/16	ND	ND	ND
	10/12/16	ND	ND	ND
	8/11/16	ND	ND	ND
	5/11/16	ND	ND	ND
	4/6/16	ND	ND	ND
	3/17/16	ND	ND	ND
	2/10/16	ND	ND	ND
	1/14/16	ND	ND	ND
P-12W	7/12/18	**2.1**	**0.4**	**0.7**
	6/7/18	**2.0**	**0.5**	**0.8**
	5/16/18	**2.4**	**0.6**	**1.0**
	4/16/18	**5.3**	**1.2**	**1.7**
	3/15/18*	**4.2**	**1.0**	**1.2**
	2/15/18	**3.9**	**1.0**	**1.3**
	1/11/18	**4.2**	ND	**1.1**
	12/7/17	**2.0**	ND	ND
	11/9/17	**2.5**	ND	ND
	10/19/17	**4.6**	ND	**1.27**
	9/7/17	**3.4**	ND	**1.0**
	8/23/17	**3.4**	ND	**1.1**
	7/5/17	**1.8**	ND	ND
	6/8/17	**2.1**	ND	ND
	5/4/17	**2.3**	ND	ND
	4/5/17	**2.7**	**1.2**	**1.0**
	3/19/17	**4.0**	**1.7**	**1.2**
	2/9/17	**4.3**	ND	**1.5**
	1/12/17	**3.6**	ND	**1.0**

Well	Date	PCE (µg/L)	TCE (µg/L)	cis-DCE (µg/L)
P-12W Continued	12/8/16	**2.4**	ND	ND
	11/10/16	**2.4**	ND	ND
	10/12/16	**2.8**	ND	**1.0**
	9/8/16	**2.4**	ND	ND
	8/11/16	**3.3**	ND	ND
	7/6/16	**2.0**	**1.7**	ND
	6/9/16	**2.1**	ND	ND
	5/11/16	**2.6**	ND	ND
	4/6/16	**5.8**	ND	**1.2**
	3/17/16	ND	ND	**1.0**
	2/10/16	**5.1**	ND	**1.0**
	1/14/16	**2.8**	ND	ND
P-3W	7/12/18	ND	ND	ND
	6/7/18	ND	ND	**0.2**
	5/16/18	ND	ND	**0.4**
	4/16/18	ND	ND	**0.6**
	3/15/18*	ND	ND	ND
	2/15/18	ND	ND	ND
	1/11/18	ND	ND	ND
	12/7/17	ND	ND	ND
	11/9/17	ND	ND	ND
	10/19/17	ND	ND	ND
	9/7/17	ND	ND	ND
	8/10/17	ND	ND	ND
	7/5/17	ND	ND	ND
	6/8/17	ND	ND	ND
	5/4/17	ND	ND	ND
	4/5/17	ND	ND	ND
	3/19/17	ND	ND	ND
	2/9/17	ND	ND	ND
	1/12/17	ND	ND	ND
	12/8/16	ND	ND	ND
	11/10/16	ND	ND	ND
	10/12/16	ND	ND	ND
	8/11/16	ND	ND	ND
	5/11/16	ND	ND	ND
	4/6/16	ND	ND	ND
	3/16/16	ND	ND	ND
	2/10/16	ND	ND	ND
	1/14/16	ND	ND	ND
P-19W	7/12/18	ND	ND	ND
	6/7/18	ND	ND	ND
	4/16/18*	ND	ND	ND
	11/9/17	ND	ND	ND
	10/19/17	ND	ND	ND

Well	Date	PCE (µg/L)	TCE (µg/L)	cis-DCE (µg/L)
P-19W Continued	9/7/17	ND	ND	ND
	8/23/17	ND	ND	ND
	7/5/17	ND	ND	ND
	6/8/17	ND	ND	ND
	5/4/17	ND	ND	ND
	4/5/17	ND	ND	ND
	11/10/16	ND	ND	ND
	10/12/16	ND	ND	ND
	8/11/16	ND	ND	ND
	5/11/16	ND	ND	ND
	4/6/16	ND	ND	ND
P-16	7/12/18	ND	ND	ND
	6/7/18	**2.0**	**0.4**	**0.8**
	5/16/18	ND	ND	ND
	4/16/18	ND	ND	ND
	3/15/18*	ND	ND	ND
	1/11/18	ND	ND	ND
	12/7/17	ND	ND	ND
	11/9/17	ND	ND	ND
	10/19/17	ND	ND	ND
	9/7/17	ND	ND	ND
	8/10/17	ND	ND	ND
	7/5/17	ND	ND	ND
	6/8/17	ND	ND	ND
	5/4/17	ND	ND	ND
	4/5/17	ND	ND	ND
	3/19/17	ND	ND	ND
	2/9/17	ND	ND	ND
	1/12/17	ND	ND	ND
	12/8/16	ND	ND	ND
	11/10/16	ND	ND	ND
	10/12/16	ND	ND	ND
	8/11/16	ND	ND	ND
	6/9/16	ND	ND	ND
MW-S	10/5/16	ND	ND	ND

Notes: Data provided by City of Troy (Troy) 2018

Bold represents detected analyte
Bold and Highlight represent analyte detection above its Maximum Contaminant Level (MCL)
*Laboratory reporting data less than the Reporting Limit (RL) and above Method Detection Limit (MDL).
RL for PCE = 1.0 µg/L; MDL for PCE = 0.2 µg/L; EPA MCL for PCE = 5.0 ppb
RL for TCE = 1.0 µg/L; MDL for TCE = 0.2 µg/L; EPA MCL for TCE = 5.0 ppb
RL for cis-DCE = 1.0 µg/L; MDL for cis-DCE = 0.2 µg/L; EPA MCL for cis-DCE = 70 ppb
µg/L-Micrograms per liter; cis-DCE- cis-1,2-Dichloroethene ; ND- Not detected; PCE- Tetrachloroethene; TCE- Trichloroethene

Table 2: EPA Evaluation for Site Remedy

Remedy Evaluation Criteria Table

	Groundwater Alternatives					Private Well Alternatives		
Evaluation Criteria	GW-1	GW-3A	GW-3B	GW-3C*	GW-4	PR-1	PR-2	PR-3*
Overall Protection of Human Health and the Environment	☐	◆	◆	◆	◆	☐	◆	◆
Compliance with ARARs	☐	◆	◆	◆	◆	☐	◆	◆
Long-Term Effectiveness and Permanence	☐	❖	◆	◆	❖	☐	❖	◆
Reduction of Toxicity, Mobility and Volume through Treatment	☐	❖	❖	❖	❖	☐	◆	❖
Short-Term Effectiveness	☐	❖	❖	❖	❖	☐	◆	◆
Implementability	☐	◆	◆	◆	◆	☐	◆	◆
Cost	$0	$4.67 million	$6.06 million	$5.93 million	$4.62 million	$0	$55,000	$47,000
State Acceptance	The state of Ohio agrees with U.S. EPA's recommended alternatives							
Community Acceptance	To be evaluated after the public comment period							

◆ = Meets criterion ❖ = Partially meets criterion ☐ = Does not meet criterion

* U.S. EPA recommended alternatives

Vapor intrusion alternatives, VI-1 and VI-2 are not included in the table because a comparative evaluation is not necessary when only one "active" alternative exists and the other is the "no action" alternative.

Groundwater Alternative GW-2: Institutional controls (deed restrictions) and monitoring was not evaluated individually but was incorporated into the other groundwater alternatives.

Table 3: Site Risk Hazard Summary

Exposure Area	Medium	Receptor	Exposure Pathway	Risk	Risk COCs	HI	HI COCs
Area 1 -- Apex 515 N Elm	Soil	--	--	--	--	--	--
	Groundwater	Industrial/Commercial Worker	Potable uses	**8.1E-06**	**1,4-DCB; benzene**	0.1	NA
			VI	**2.7E-06**	Benzene	0.09	NA
				1E-05		0.2	
		Construction Worker	Dermal and inhalation	2E-08	NA	0.1	NA
		Utility Worker	Dermal and inhalation	1E-07	NA	0.03	NA
		Resident	Potable uses	**3.5E-05**	**1,4-DCB; benzene; PCE**	0.5	NA
			VI	**1.2E-05**	Benzene; CT; EB	0.3	NA
				5E-05		0.8	NA
Area 1 - Bob's Auto 507 N Elm	Soil	--	--	--	--	--	--
	Groundwater	Industrial/Commercial Worker	Potable uses	**8.1E-06**	**1,4-DCB; benzene**	0.1	NA
			VI	**7.3E-06**	Benzene; 1,2-DCA; EB; **TCE**	0.9	NA
				2E-05		1	
		Construction Worker	Dermal and inhalation	5E-07	NA	0.1	NA
		Utility Worker	Dermal and inhalation	**4E-06**	**1,4-DCB**; **benzene**	0.03	NA
		Resident	Potable uses	**3.5E-05**	**1,4-DCB; benzene; PCE**	0.5	NA
			VI	**3.6E-05**	Benzene; 1,2-DCA; CT; EB; **TCE**	**3.6**	**TCE**
				7E-05		**4**	
Area 2 - GW Plume	Soil	--	--	--	--	--	--
	Groundwater	Industrial/Commercial Worker	Potable uses	**1.8E-06**	**PCE**	0.4	NA
			VI	9.3E-07	NA	0.3	NA
				3E-06		0.7	
		Construction Worker	Dermal and inhalation	7E-08	NA	0.5	NA
		Utility Worker	Dermal and inhalation	5E-07	NA	0.1	NA
		Resident	Potable uses	**6.9E-06**	**PCE; TCE**	**1.6**	**PCE**
			VI	**4.3E-06**	NA	NA	NA
				1E-05			

Notes:

Risk and hazard results presented in this table were summarized from exposure area-specific risk and hazard summary tables presented in the risk assessment (see Appendix I to the Remedial Investigation report).

Number Risk ≥ 1E-06 and/or HI > 1

Bolded COCs are those judged to be site-related; unbolded COCs are judged to be related largely or entirely to indoor, on-going industrial/commercial operations.

COC- Contaminant of concern (risk ≥ 1E-06 or HI > 1; COPC- Contaminant of Potential Concern; CT- Carbon Tetrachloride; 1,4-DCB- 1,4-Dichlorobenzene; EB- Ethylbenzene; PCE- Tetrachloroethene; TCE- Trichloroethene; VI- Vapor Intrusion

Table 4: Potential Federal ARARs for Site

Requirement	Prerequisite	Citation	Comment
CHEMICAL-SPECIFIC			
Effluent limitations on point source pollutant discharges to waters of U.S.	Groundwater Discharge to Surface Water	CWA of 1977 33 U.S.C. Subsection 1251, et seq.	Not applicable or relevant and appropriate. RI results show groundwater does not discharge to surface water.
Establishes MCLs, which are health risk-based standards for public water systems.	Groundwater is current or potential source of drinking water	SDWA of 1974 40 C.F.R. 141 and 142	Applicable. All City of Troy residents supplied by municipal system; Troy prohibits private wells for potable uses, allows wells for agricultural irrigation. However, site groundwater contamination also exists north of city limits in unincorporated Miami County where there is no provision precluding use of groundwater beyond city limits.
Establishes welfare-based secondary standards for public water systems.	Groundwater is current or potential source of drinking water	SDWA of 1974 40 C.F.R. 143	Applicable. All City of Troy residents supplied by municipal system; Troy prohibits private wells for potable uses, allows wells for agricultural irrigation. However, site groundwater contamination also exists north of city limits in unincorporated Miami County where there is no provision precluding use of groundwater beyond city limits.
LOCATION-SPECIFIC			
No adverse impact to a wetland	Remedial action within an on-site wetland or disturbance to off-site wetland	CWA of 1977 40 C.F.R. 6.302(a) Appendix A	Not applicable or relevant and appropriate. No wetlands are on-site or within the footprint of the plume (reference: National Wetlands Inventory, 2014).
Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste within a 100-year floodplain	40 C.F.R. 264.18(b)	Applicable. A portion of the West Troy Contaminated Aquifer (WTCA) site is located within the 100-year flood plain.
Preservation of historic or prehistoric resources (including structures) in National Historic Register sites.	Site (or structures) listed in National Register of Historic Places	NHPA of 1966 16 U.S.C. Subsection 470 et seq.	Not applicable or relevant and appropriate. Site (or on-site structures) not listed in Register.

Requirement	Prerequisite	Citation	Comment
No adverse impacts to threatened or endangered species	This act requires federal agencies to ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or adversely modify critical habitat.	16 U.S.C. § 1531 50 C.F.R. 200	Not applicable or relevant and appropriate. No endangered species that would be affected by remedial actions are known to be present at the site.
Requirements to minimize adverse effects in floodplain	This order requires federal agencies to evaluate potential adverse effects associated with direct and indirect development of a floodplain.	40 C.F.R. Part 6, Appendix A	This order is applicable to any construction activities in the Great Miami River floodplain.
Requirement	**Prerequisite**	**Citation**	**Comment**
ACTION-SPECIFIC			
Effluent limitations on point source pollutant discharges to waters of U.S.	Treated Groundwater Discharge to Surface Water	NPDES, 33 USC, §§ 1251-1387, Clean Water Act NPDES Permit Program (40 C.F.R. 122)	Potentially applicable depending on the remedial action chosen; program requirements apply to extracted groundwater discharged to surface waters.
Establishes permit requirements to regulate discharge.	This requirement establishes a permit program to regulate discharge into waters of the United States, including wetlands.	Federal Water Pollution Control Act, Section 401: Water Quality Certification	Potentially applicable depending on the remedial action chosen.
Underground injection control	These regulations protect groundwater sources of drinking water by imposing restrictions on underground injections.	40 C.F.R. 114-147	Potentially applicable depending on the remedial action chosen. Some alternatives include injecting reagents to treat groundwater; however, injection and recirculation of contaminated groundwater is not considered at this time.
Minimum design and operation criteria for land disposal of solid wastes	Regulated solid waste disposal unit	40 C.F.R. Part 257 Subpart A	Not applicable. No regulated units currently on site; substantive requirements may be relevant and appropriate for certain alternatives.

Requirement	Prerequisite	Citation	Comment
Site closure, operation and maintenance, monitoring and record-keeping at regulated waste units	RCRA Regulated Hazardous Waste Unit	40 C.F.R. Subpart G, § 264.110	Not applicable or relevant and appropriate. The WTCA site is not a RCRA hazardous waste regulated unit; no hazardous waste has been identified on site.
Requirements for Corrective Action Management Unit at RCRA-permitted transportation, storage, and disposal facilities undergoing corrective action.	Creation of a Corrective Action Management Unit	40 C.F.R. Part 264.552	Not applicable or relevant and appropriate. No hazardous waste has been identified on site.
Land disposal restrictions prohibit disposal of hazardous waste unless treatment standards are met.	Disposal of hazardous waste on site	40 C.F.R. 268	May be relevant and appropriate if RCRA - characteristic waste is generated as part of alternative.

Notes:

ARAR = Applicable or relevant and appropriate requirement
C.F.R. = Code of Federal Regulations
CWA = Clean Water Act
MCL = Maximum Contaminant Level
NHPA = National Historic Preservation Act
NPDES = National Pollutant Discharge Elimination System
RCRA = Resource Conservation and Recovery Act
SDWA = Safe Drinking Water Act
U.S.C. = United States Code
WTCA = West Troy Contaminated Aquifer Site

Table 5: Potential Ohio ARARs for Site

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
ODNR	1517.16			Channel modifications must be approved	LOCATION	No governmental body may modify the channel of any watercourse within a wild, scenic or recreational river area outside the limits of a municipal corporation without approval from the director of ODNR	Consider for any action that includes dredging or altering of riverbanks.
ODNR	1518.02			Endangered plant species	LOCATION	Prohibits removal or destruction of endangered plant species (some private property exceptions).	Applies to remediation sites where chemicals may harm endangered species. Clearly establishes that receptor plant species must be considered in risk assessments. This act may require consideration of endangered species in remediations that involve movement or displacement of large volumes of surface soil.
ODNR	1521.06			Construction permits for dams, dikes and levees	LOCATION	No dam may be constructed for the purpose of storing, conserving or retarding water, or for any other purpose, nor shall any dike or levee be constructed for the purpose diverting or retaining flood water without a permit.	The substantive requirements of this section pertain to remedies that will create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.
ODNR	1521.062		A-G	Monitoring, maintenance & operation (dams, dikes, levees)	LOCATION	Dams, dikes and levees (and all appurtenances) shall monitored, maintained and operated safely in accordance with state rules, terms and conditions of the permit and other requirements issued pursuant to this section or section 1521.06 of the ORC.	The substantive requirements of this section pertain to remedies that will create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.
ODNR	1531.25			Endangered animal species	LOCATION	Prohibits removal or destruction of endangered animal species	Applies to remediation sites where chemicals may harm endangered species. Clearly establishes that receptor animal species must be considered in risk assessments. This act may require consideration of endangered species in remediations that involve movement or displacement of large volumes of surface soil.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
APC	3704.05		A-I	Prohibits violation of air pollution control rules	ACTION	Prohibits emission of an air contaminant in violation sec. 3704 or any rules, permit, order or variance issued pursuant to that section of the ORC.	May pertain to any site where emissions of an air contaminant occurs either as a pre-existing condition of the site or as a result of remedial activities. Should be considered for virtually all sites that require the management of solid/hazardous wastes.
HW	3734.02		(H)	"digging" where hazardous or solid waste facility was located	LOCATION	Filling, grading, excavating, building, drilling or mining on land where hazardous waste or solid waste facility was operated is prohibited without prior authorization from the director of the Ohio EPA.	Pertains to any site at which hazardous or solid waste has come to be located. Certain alternatives include excavation activities which may uncover solid and/or hazardous waste. Should those activities require the management of solid/hazardous wastes on-site, an exemption to permitting and other requirements may be warranted.
HW APC	3734.02		(I)	Air emissions from hazardous waste facilities	ACTION	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor or odorous substance that interferes with the comfortable enjoyment of life or property or is injurious to public health.	Pertains to any site at which hazardous waste will be managed such that air emissions may occur. Consider for sites that will undergo movement of earth or incineration.
DSIWM	3734.03			Prohibits open dumping or burning	ACTION	Prohibits open burning or open dumping of solid waste or treated or untreated infectious waste.	Pertains to any site at which solid waste has come to be located or will be generated during a remedial action.
APC DSW	3767.13			Prohibition of nuisances	ACTION	Prohibits noxious exhalations or smells and the obstruction of waterways.	Pertains to any site that may have noxious smells or may obstruct waterways.
DSW	3767.14			Prohibition of nuisances	ACTION	Prohibition against throwing refuse, oil, or filth into lakes, streams, or drains.	Pertains to all sites located adjacent to lakes, streams, or drains.
DERR	5301.00		.80 TO .92	Uniform environmental covenants act	LOCATION	Standards for environmental covenants	Consider for sites with institutional controls or use restrictions

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
DSW	6101.19			Conservancy districts	LOCATION	Board of directors of a conservancy district may make and enforce rules and regulations pertaining to channels, ditches, pipes, sewers, etc.	This statute pertains to any site that may affect a construction within a conservancy district.
DSW	6111.04			Acts of pollution prohibited	ACTION	Pollution of waters of the state is prohibited.	Pertains to any site which has contaminated on-site ground or surface water or will have a discharge to on-site surface or ground water.
DSW	6111.07		A,C	Water pollution control requirements - duty to comply	ACTION	Prohibits failure to comply with requirements of sections 6111.01 to 6111.08 or any rules, permit or order issued under those sections.	Pertains to any site which has contaminated ground water or surface water or will have a discharge to on-site surface or ground water.
DSW	6111.04.2			Rules requiring compliance with national effluent standards	ACTION	Establishes regulations requiring compliance with national effluent standards.	Pertains to any site which will have a point source discharge.
ODNR		1501:21-11	03-05	Predesign investigations (dams, dikes, levees)	LOCATION	Presents predesign requirements for dams, dikes and levees. Includes on-site construction material data, surveys and hydrologic and hydraulic investigations.	Pertains to remedies that create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.
ODNR		1501:21-13	10-14	Additional design requirements for dikes and levees	LOCATION	Presents design requirements specific to dikes and levees. Includes criteria such as design storm and flood and freeboard requirements.	Pertains to remedies that create or alter a dike or levee. Consider for sites within a floodplain.
ODNR		1501:21-15	06	Operation, maintenance and inspections	LOCATION	Presents the minimum information required in a plan addressing the operation, maintenance and inspection of dams, dikes and levees.	Pertains to remedies that create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
ODNR		1501: 21-21	03-04	Deficiency and O & M of dams, dikes and levees	LOCATION	Dams, dikes and levees must be operated safely. Repairs or other remedial measures shall be performed on dams, dikes and levees as necessary to safeguard life, health or property.	Pertains to remedies that create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.
ODNR		1501: 21-5	02-06	Design requirements for dams, dikes and levees	LOCATION	Specifies minimum information required during design for Ohio DNR to determine adequacy of proposed dam, dike or levee. Includes design reports, plans and specifications.	Pertains to remedies that create or alter a dam, dike or levee. Consider for sites with on-site surface water and for sites within a floodplain.
ODNR		1501: 31-23	01, A-B	List of endangered animal species	LOCATION	List of Ohio animal species considered endangered.	May apply to remediation sites where listed species are threatened by chemical releases. May also apply at sites where remedial activities could disturb existing habitats.
ODNR		1501-18-1	03, A	List of endangered plant species	LOCATION	Plant species considered endangered in Ohio	May apply at remediation sites where chemical release threatens listed species. Should also be considered where remedial activities may disrupt habitats.
DSW		3745-1-03		Analytical and collection procedures	ACTION	Specifies analytical methods and collection procedures for surface water discharges.	Pertains to both discharges to surface waters as a result of remediation and any on-site surface waters affected by site conditions.
DSW		3745-1-04	A,B,C,D, E	The "five freedoms" for surface water	ACTION	All surface waters of the state shall be free from: a) objectionable suspended solids. B) floating debris, oil and scum. C) materials that create a nuisance. D) toxic, harmful or lethal substances. E) nutrients that create nuisance growth	Pertains to both discharges to surface waters as a result of remediation and any on-site surface waters affected by site conditions.
DSW		3745-1-05	A-C	Antidegradation policy for surface water	ACTION	Prevents degradation of surface water quality below designated use or existing water quality. Existing in stream uses shall be maintained and protected. The most stringent controls for treatment shall be required by the director to be employed	Requires that best available technology (bat) be used to treat surface water discharges. DWQPA uses this rule to set standards when existing water quality is better than the designated use.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
						for all new and existing point source discharges. Prevents any degradation of state resource waters	
DSW		3745-1-06	A,B	Mixing zones for surface water	ACTION	(a) presents the criteria for establishing non-thermal mixing zones for point source discharges (b) presents the criteria for establishing thermal mixing zones for point source discharges	Applied as a term of discharge permit to install. Would pertain to an alternative which resulted in a point source discharge.
DSW		3745-1-21		Water use DES for Great Miami River	LOCATION	Establishes water use designations for stream segments within the Great Miami River basin	Pertinent if stream or stream segment is on-site and is either affected by site conditions of if remedy includes direct discharge. Used by DSW to establish waste load allocations
DSW		3745-1-34		Water quality criteria for Ohio river drainage basin	LOCATION	Establishes criteria for surface water in Ohio river drainage basin.	Pertinent if stream or stream segment is on-site and is either affected by site conditions of if remedy includes direct discharge. Used by DSW to establish waste load allocations
APC		3745-15-05	A-D	De minimis air contaminant source exemption	ACTION	Establishes limits below which air discharge permits are not needed	Pertains to any site which utilizes or will utilize air pollution control equipment on-site.
APC		3745-15-06	A1,A2	Malfunction & maintenance of air poll control equipment	ACTION	Establishes scheduled maintenance and specifies when pollution source must be shut down during maintenance	Pertains to any site which utilizes or will utilize air pollution control equipment on-site.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
APC		3745-15-07	A	Air pollution nuisances prohibited	ACTION	Defines air pollution nuisance as the emission or escape into the air from any sources(s)) of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors and combinations of the above that endanger health, safety or welfare of the public or cause personal injury or property damage. Such nuisances are prohibited.	Pertains to any site which causes, or may reasonably cause, air pollution nuisances. Consider for sites that will undergo excavation, demolition, cap installation, methane production, clearing and grubbing, water treatment, incineration and waste fuel recovery.
APC		3745-17-08	A1,A2,B,D	Emission restrictions for fugitive dust	ACTION	All emissions of fugitive dust shall be controlled.	Pertains to sites which may have fugitive emissions (non-stack) of dust. Consider for sites that will undergo grading, loading operations, demolition, clearing and grubbing and construction utilize incineration or fuel recovery (waste fuel recovery)
APC		3745-21-09		VOC emissions control: stationary sources	ACTION	Establishes limitations for emissions of volatile organic compounds from stationary sources.	Pertains to any site with treatment systems that emit volatile organic compounds, including those with thermal desorption and air stripping.
HW		3745-270-03	A-D	Dilution prohibited as a substitute for treatment.	ACTION	Forbids dilution as a means of achieving land disposal restriction levels	Consider for remedial options including land disposal or leaving wastes in-place
HW		3745-270-07	A-E	Testing, tracking, and recordkeeping requirements	ACTION	Testing, tracking, and recordkeeping requirements for generators, treaters, and disposal facilities.	Consider for sites at which wastes are generated, stored, disposed, or treated
HW		3745-270-09	A-D	Special rules regarding characteristic wastes	ACTION	Rules applicable to land disposal of characteristic wastes	Consider for sties that generate characteristic wastes

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-270-40	A-J	Applicability of treatment standards	CHEMICAL	Detailed listing of chemical specific land treatment standards or required treatment technologies.	Consider for sites that generate wastes or with wastes disposed on-site
HW		3745-270-42	A-D	Treatment standards expressed as specified technologies	CHEMICAL	Lists specific treatment technologies required for specific wastes	Consider at all sites generating wastes or with on-site disposal
HW		3745-270-45	A-D	Treatment standards for hazardous debris	CHEMICAL	Specifies treatment technologies and performance standards for various debris.	Consider for sites with contamination by debris.
HW		3745-270-48	A	Universal treatment standards	CHEMICAL	Gives contaminant chemical specific standards for land disposal	Consider for sites with waste generation or on-site disposal
HW		3745-270-49	A-E	Land disposal restriction for contaminated soils	CHEMICAL	Specifies standards for soil treatment	Consider at sites where contaminated soils are generated
HW		3745-270-50	A-G	Prohibition on Storage of Restricted Wastes	CHEMICAL	Prohibits on site storage of restricted wastes	Consider at sites where wastes are generated by remedial activities
DSW		3745-3-04	A-D	Prohibited discharges	ACTION	Places restrictions on discharges to POTW's that may harm treatment functions or pass through to receiving stream.	Consider for sites with discharges to POTW
APC		3745-31-02	A,C,D	Permit to install, general requirements	ACTION	General requirements for permit to install air pollution sources	Consider for sites with potential for air emissions, including sites with soil vapor extraction, thermal desorption, incineration or other treatment technologies with air emissions

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
APC		3745-15-08	A	Circumvention	ACTION	Forbids dilution or other means to conceal emissions without actual reductions.	Consider for sites with emissions to air, air stripping, incineration, or soil vapor extractions.
UIC		3745-34-06		Prohibition of unauthorized injection	ACTION	Underground injection is prohibited without authorization from the director.	Pertains to sites at which materials are to be injected underground. Consider for technologies such as bioremediation and soil flushing.
UIC		3745-34-07		No movement of fluid into underground drinking water	ACTION	The underground injection of fluid containing any contaminant into an underground source of drinking water is prohibited if the presence of that contaminant may cause a violation of the primary drinking water standards or otherwise adversely affect the health of persons.	Pertains to sites at which materials are to be injected underground. Consider for technologies such as bioremediation and soil flushing.
UIC		3745-34-09		Requirements for wells injecting hazardous waste	ACTION	Specifies requirements for the injection of hazardous wastes underground. See 3745-34-08 for limitations.6 of the ORC.	Pertains to sites at which materials are to be injected underground. Consider for technologies such as bioremediation and soil flushing.
UIC		3745-34-26		Conditions applicable to all permits	ACTION	Specifies minimum conditions to be applied to all underground injections.	Pertains to sites at which materials are to be injected underground. Consider for technologies such as bioremediation and soil flushing.
UIC		3745-34-34		Mechanical integrity	ACTION	Specifies requirements to be met to ensure mechanical integrity of wells.	Pertains to sites at which materials are to be injected underground. Consider for technologies such as bioremediation and soil flushing.
HW		3745-50-44	A	Permit info required for all hazardous waste facilities	ACTION	Establishes the substantive hazardous waste permit requirements necessary for Ohio EPA to determine facility compliance. Includes information such as facility description, waste characteristics,	Pertains to any site which will have treatment, storage or disposal of hazardous waste occurring on-site or has existing areas of hazardous waste contamination on-site that will be capped in-place. This, along with other paragraphs of this rule, establishes the

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
						equipment descriptions, contingency plan, facility location, topographic map, etc.	minimum information required during the remedial design stage. Corrective action for waste management units
HW		3745-50-44		Permit info required for all hazardous waste land disposal facilities	ACTION	Establishes the substantive hazardous waste land disposal permit requirements necessary for Ohio EPA to determine adequate protection of the ground water. Includes information such as ground water monitoring data, information on interconnected aquifers, plume(s) of contamination, plans and reports on ground water monitoring program, etc. Management of solid/hazardous was	Pertains to any facility/site which will have hazardous waste disposed of on-site or has existing areas of hazardous waste contamination on-site that will be capped in-place. This, along with other paragraphs of this rule, establishes the minimum information required during the remedial design stage.
HW		3745-50-58	E,I,J	Conditions applicable to all permits	ACTION	Establishes general permit conditions applied to all hazardous waste facilities in Ohio. Includes conditions such as operation and maintenance, site access, monitoring, etc.	Pertains to all alternatives that will incorporate treatment, storage or disposal of hazardous waste.
HW		3745-52-11	A-D	Evaluation of wastes	ACTION	Any person generating a waste must determine if that waste is a hazardous waste (either through listing or by characteristic).	Pertains to sites at which wastes of any type (both solid and hazardous) are located.
HW		3745-52-12	A-C	Generator identification number	ACTION	A generator must not store, treat dispose or transport hazardous wastes without a generator number	Pertains to sites where hazardous waste will be transported off-site for treatment, storage or disposal
HW		3745-52-20		Hazardous waste manifest - general requirements	ACTION	Requires a generator who transports or offers for transportation hazardous waste for off-site treatment, storage or disposal to prepare a uniform hazardous waste manifest	Pertains to sites where hazardous waste will be transported off-site for treatment, storage or disposal

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-52-22		Hazardous waste manifest - number of copies	ACTION	Specifies the number of manifest copies to be prepared	Pertains to sites where hazardous waste will be transported off-site for treatment, storage or disposal
HW		3745-52-23		Hazardous waste manifest - use	ACTION	Specifies procedures for the use of hazardous waste manifests including a requirement that they be hand signed by the generator	Pertains to sites where hazardous waste will be transported off-site for treatment, storage or disposal
HW		3745-52-30		Hazardous waste packaging	ACTION	Requires a generator to package hazardous waste in accordance with U.S. DOT regulations for transportation off-site.	Pertains to any site where hazardous waste will be generated by on-site activities and shipped off-site for treatment and/or disposal.
HW		3745-52-31		Hazardous waste labeling	ACTION	Requires packages of hazardous waste to be labeled in accordance with u.s.dot regulations for off-site transportation.	Pertains to any site where hazardous waste will be generated by on-site activities and shipped off-site for treatment and/or disposal.
HW		3745-52-32		Hazardous waste marking	ACTION	Specifies language for marking packages of hazardous waste prior to off-site transportation	Pertains to any site where hazardous waste will be generated by on-site activities and shipped off-site for treatment and/or disposal.
HW		3745-52-33		Hazardous waste placarding	ACTION	Generator shall placard hazardous waste prior to off-site transportation.	Pertains to any site where hazardous waste will be generated by on-site activities and shipped off-site for treatment and/or disposal.
HW		3745-52-34		Accumulation time of hazardous waste	ACTION	Identifies maximum time periods that a generator may accumulate a hazardous waste without being considered an operator of a storage facility. Also establishes standards for management of hazardous wastes by generators.	Pertains to a site where hazardous waste will be generated as a result of the remedial activities.
HW		3745-52-40	A-D	Recordkeeping requirements, three-year retention	ACTION	Specifies records that shall be kept for three years	Consider for sites at which hazardous wastes are generated
HW		3745-52-41	A,B	Annual report	ACTION	Requires generators to prepare annual report to Ohio EPA	Applicable at sites generating wastes for offsite shipment

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-54-13	A	General analysis of hazardous waste	ACTION	Prior to any treatment, storage or disposal of hazardous wastes, a representative sample of the waste must be chemically and physically analyzed.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-14	A,B,C	Security for hazardous waste facilities	ACTION	Hazardous waste facilities must be secured so that unauthorized and unknowing entry are minimized or prohibited.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-15	A,C	Inspection requirements for hazardous waste facilities	ACTION	Hazardous waste facilities must be inspected regularly to detect malfunctions, deteriorations, operational errors and discharges. Any malfunctions or deteriorations detected shall be remedied expeditiously.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-16		Personnel training	ACTION	Establishes requirements for training of personnel at hazardous waste facilities	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-18	A,B,C	Location standards for hazardous waste t/s/d facilities	LOCATION	Restricts the siting of hazardous waste facilities in areas of seismic activity or floodplains.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-31		Design & operation of hazardous waste facilities	ACTION	Hazardous waste facilities must be designed, constructed, maintained and operated to minimize the possibility of fire, explosion or unplanned release of hazardous waste or hazardous constituents to the air, soil or surface water which could threaten human health or the environment.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-32	A,B,C,D	Required equipment for hazardous waste facilities	ACTION	All hazardous waste facilities must be equipped with emergency equipment, such as an alarm system, fire control equipment and a telephone or radio.	Pertains to any site at which hazardous is to be treated, stored or disposed of (or has been disposed of). Specifications

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-54-33		Testing & maintenance of equipment; hazardous waste facilities	ACTION	All hazardous waste facilities must test and maintain emergency equipment to assure proper operation.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-34		Access to communications or alarm system; hazardous waste facilities	ACTION	Whenever hazardous waste is being handled, all personnel involved shall have immediate access to an internal alarm or emergency communication device.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-37	A,B	Arrangements/ agreements with local authorities	ACTION	Arrangements or agreements with local authorities, such as police, fire department and emergency response teams must be made. If local authorities will not cooperate, documentation of that non-cooperation should be provided.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-52	A-F	Content of contingency plan; hazardous waste facilities	ACTION	Hazardous waste facilities must have a contingency plan that addresses any unplanned release of hazardous wastes or hazardous constituents into the air, soil or surface water. This rule establishes the minimum required information of such a plan.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-53	A,B	Copies of contingency plan; hazardous waste facilities	ACTION	Copies of the contingency plan required by 3745-54-50 must be maintained at the facility and submitted to all local police departments, fire departments, hospitals local emergency response teams and the Ohio EPA.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-54-54	A	Amendment of contingency plan; hazardous waste facilities	ACTION	The contingency plan must be amended if it fails in an emergency, the facility changes (in its design, construction, maintenance or operation), the list of emergency coordinators change or the list of emergency equipment.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-55		Emergency coordinator; hazardous waste facilities	ACTION	At all times there should be at least one employee either on the premises or on call to coordinate all emergency response measures.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-56	A-I	Emergency procedures; hazardous waste facilities	ACTION	Specifies the procedures to be followed in the event of an emergency.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been disposed of).
HW		3745-54-73	A,B	Operating record	ACTION	Specifies records to be kept at TSD facilities	Consider for sites with on-site treatment, storage or disposal
HW		3745-54-77	A	Additional reports	ACTION	Requires facilities to report fires, explosions or other mishaps	Consider at sites with treatment, storage or disposal on-site
HW		3745-55-11	A,B,C	General closure performance standard; hazardous waste facility	ACTION	Requires that all hazardous waste facilities be closed in a manner that minimizes the need for further maintenance, controls, minimizes, eliminates or prevents post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off or hazardous waste decomposition products to the ground or surface water or the atmosphere.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been treated, stored or disposed of).
HW		3745-55-12	B	Content of closure plan; hazardous	ACTION	Specifies the minimum information required in a closure plan for Ohio EPA to determine the adequacy of the plan.	Substantive requirements pertain to any site at which hazardous waste is to be treated, stored or disposed of (or has been treated, stored or disposed of).

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
				waste facilities			
HW		3745-55-14		Disposal/ decon of equipment, structures & soils	ACTION	Requires that all contaminated equipment, structures and soils be properly disposed of or decontaminated. Removal of hazardous wastes or constituents from a unit may constitute generation of hazardous wastes.	Pertains to any site at which hazardous waste is to be treated, stored or disposed of (or has been treated, stored or disposed of).
HW		3745-55-17	B	Post-closure care and use of property	ACTION	Specifies the post-closure care requirements, including maintenance, monitoring and post-closure use of property.	Pertains to all sites with land-based hazardous waste units (landfills and surface impoundments, waste piles, land treatment units and tanks that meet requirements of landfills after closure). This includes existing land-based areas of contamination.
HW		3745-55-18	B	Post-closure plan	ACTION	Presents the information necessary for Ohio EPA to determine the adequacy of a post-closure plan.	Pertains to all sites with land-based hazardous waste units (landfills and surface impoundments, waste piles, land treatment units and tanks that meet requirements of landfills after closure). This includes existing land-based areas of contamination.
HW		3745-55-19	B	Notice to local land authority	ACTION	Requires that a record of the type, location and quantity of hazardous wastes disposed of in each unit be submitted to the local land authority and the director of the Ohio EPA. Also requires that a notation to the deed to the facility property be made indicating that the land was used to manage hazardous wastes and that certain use restrictions may apply to the property.	Pertains to all sites with land-based hazardous waste units (landfills and surface impoundments, waste piles, land treatment units and tanks that meet requirements of landfills after closure). This includes existing land-based areas of contamination.
HW		3745-57-03	A-I	Landfill design and operating requirements	ACTION	Presents design and operating requirements for landfills. Includes liner, leachate collection and removal, run-on/run-off control, etc.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. This rule also pertains to existing land-based areas of contamination.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
HW		3745-57-05	A,B	Monitoring and inspections of landfills	ACTION	Requires inspection of landfills during construction or installation and operation.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. This rule pertains to existing land-based areas of contamination.
HW		3745-57-09		Surveying and record keeping	ACTION	Establishes requirements for surveying and recording locations and contents of cells	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. This rule also pertains to existing land-based areas of contamination.
HW		3745-57-10	A,B	Landfill closure and post-closure care	ACTION	Specifies closure and post-closure requirements for hazardous waste landfills. Includes final cover and maintenance.	Pertains to all sites at which a hazardous waste landfill will either be located or an existing landfill will be expanded. This rule pertains to existing land-based areas of contamination.
HW		3745-57-74	A-K	Staging piles	ACTION	Design requirements for temporary waste staging piles	Pertains to remedial site where waste will be temporarily stored in piles
HW		3745-66-11	A,B,C	Closure performance standard	ACTION	Owner shall close facility in manner that minimizes need for further maintenance and reduces or eliminates pollution of ground water, surface water or atmosphere.	Consider for remedial plans that may require extended operation and maintenance of equipment. Consider alternatives with less long-term O&M. Applicable for RCRA facilities, appropriate and relevant for other sites.
DW		3745-81-11	A,B,C	Maximum contaminant levels for inorganic chemicals	CHEMICAL	Presents maximum contaminant levels for inorganics.	Pertains to any site which has contaminated ground or surface water that is either being used, or has the potential for use, as a drinking water source.
DW		3745-81-12	A,B,C	Maximum contaminant levels for organic chemicals	CHEMICAL	Presents MCLs for organics.	Pertains to any site which has contaminated ground or surface water that is either being used, or has the potential for use, as a drinking water source.

CATEGORY	ORC	OAC	PARA-GRAPH	CAPTION	TYPE (Location/ Chemical/ Action-Specific)	TEXT	POTENTIAL APPLICATION
GW		3745-9-03	A-C	Monitoring well	ACTION	Standards for design and closure of wells, compliance with DDAGW guidance	Pertains to all ground water wells on the site that either will be installed or have been installed since Feb. 15, 1975. Would pertain during the FS if new wells are constructed for treatability studies.
GW		3745-9-05	A1,B-H	Well construction	ACTION	Specifies minimum construction requirements for new ground water wells in regard to casing material, casing depth, potable water, annular spaces, use of drive shoe, openings to allow water entry, contaminant entry.	Pertains to all ground water wells on the site that either will be installed or have been installed since Feb. 15, 1975. Would pertain during the FS if new wells are constructed for treatability studies.
GW		3745-9-07	A-C	Well grouting for construction of closure	ACTION	Establishes specific grouting procedures	Pertains to all ground water wells on the site that either will be installed or have been installed since Feb. 15, 1975. Would pertain during the fs if new wells are constructed for treatability studies.
GW		3745-9-10	A,B,C	Abandoned well sealing	ACTION	Procedures for closing and sealing wells.	Pertains to all ground water wells on the site that either will be installed or have been installed since Feb. 15, 1975.

Notes:

APC	Air Pollution Control	ESA	Endangered Species Act
ARAR	Applicable or Relevant and Appropriate Requirements	Fac	Facility
CFR	Code of Federal Regulations	GW	Groundwater
CWA	Clean Water Act	HAZ	Hazardous
DERR	Division of Environmental Response and Revitalization	HW	Hazardous Waste
DSW	Division of Surface Water	OAC	Ohio Administrative Code
DW	Drinking Water	ODNR	Ohio Department of Natural Resources
EPA	Environmental Protection Agency	Ohio EPA	Ohio Environmental Protection Agency

Appendix

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
WEST TROY CONTAMINATED AQUIFER SITE
TROY, MIAMI OHIO

JUNE, 2020
SEMS ID:

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	956244	2/28/2011	Ohio EPA	U. S. EPA	Email - re: [Redacted] WTCA 2010 Supplemental Expanded Site Inspection Report	19
2	956254	3/12/2012	U. S. EPA	File	Email - re: WTCA Proposal to the U.S. EPA Superfund National Priorities List	1
3	956253	9/17/2012	U. S. EPA	File	Email - re: WTCA Added to the U.S. EPA Superfund National Priorities List	2
4	480288	8/7/2013	Kolak, S. U. S. EPA	File	Memo re: PRP Search Documentation *(This document is included by reference in the Administrative Record)*	1
5	543479	8/7/2013	T O E R O E K Associates, Inc.	Quigley, E. U. S. EPA	Letter re: Task B2A- Generic Document Management *(This document is included by reference in the Administrative Record)*	1
6	480289	9/26/2013	Kolak, S. U. S. EPA	File	Memo re: PRP Search Documentation *(This document is included by reference in the Administrative Record)*	2
7	480273	10/23/2013	Ohio Department of Health	General Public	(Final Release) Public Health Assessment	34

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
8	915634	8/20/2014	SulTRAC	U. S. EPA	Work Assignment Form - WA #199-RICO-B5SV-Initial JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	50
9	915679	9/9/2014	U. S. EPA	U. S. EPA	Work Assignment Form - WA #199-RICO-B5SV-REV.1 Initial JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	50
10	480271	9/16/2014	Kolak, S. U. S. EPA	SulTRAC	Document Submittal Form for 48072 and 48073 - (Final Release) Public Health Assessment *(This document is included by reference in the Administrative Record)*	1
11	915912	10/9/2014	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.2 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
12	916677	1/8/2015	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.3 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
13	923047	2/5/2015	SulTRAC	U. S. EP	Site Management Plan	8
14	510581	2/5/2015	SulTRAC	U. S. EPA	Quality Assurance Project Plan for Remedial Investigation / Feasibility Study - (Attachment B)	115
15	956242	5/22/2015	Gore, J., U. S. EPA	Williams L. Ohio EPA	Email - re: [Redacted] Site Specific Work Plan and 2015 QAPP Approval Documents	4
16	923038	5/22/2015	SulTRAC	U. S. EPA	Data Management Plan - REV01	10

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
17	923039	5/22/2015	SulTRAC	U. S. EPA	Field Sampling Plan for Remedial Investigation ' Feasibility Study (RI/FS) - REV01	59
18	923040	5/22/2015	SulTRAC	U. S. EPA	Field Sampling Plan for Remedial Investigation ' Feasibility Study - REV01	107
19	923041	5/22/2015	SulTRAC	U. S. EPA	Sampling and Analysis Plan	1
20	923042	5/22/2015	SulTRAC	U. S. EPA	Revised Project Planning Document and Conceptual Site Model Appendix A of FSP	20
21	923043	5/22/2015	SulTRAC	U. S. EPA	Field Sampling Plan Appendix B Figures - REV01	10
22	923044	5/22/2015	SulTRAC	U. S. EPA	Field Sampling Plan Appendix C Standard Operating Procedures - REV01	264
23	923045	5/22/2015	SulTRAC	U. S. EPA	Field Sampling Plan Appendix D - Blank Forms - REV01	5
24	923046	5/22/2015	SulTRAC	U. S. EPA	Quality Assurance Project Plan for Remedial Investigation / Feasibility Study - Figures- REV01	10
25	919737	7/21/2015	SulTRAC	U. S. EPA	Work Assignment Form - WA #199-RICO-B5SV-REV.004 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
26	928723	7/30/2015	U. S. EPA	File	SF 135 - 1970-2015- Remedial Site Files- Miscellaneous Superfund Remedial Action Site Files (Partial SDMS)	76

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
27	498829	10/22/2015	U. S. EPA	File	Environmental Indicator Worksheets (Long-Term Human Health Protection Worksheet and Migration of Contaminated Groundwater under Control Worksheet) *(This document is included by reference in the Administrative Record)*	2
28	924818	2/24/2016	SulTRAC	U. S. EPA	Final Phase I Data Evaluation Summary Report - Remedial Investigation / Feasibility Study (RI/FS)	26
29	924674	3/17/2016	SulTRAC	U. S. EPA	Work Assignment Form - WA #199-RICO-B5SV-REV.005 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	47
30	928369	6/23/2016	SulTRAC	U. S. EPA	Work Assignment Form - WA #199-RICO-B5SV-REV.006 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	47
31	956250	6/27/2016	Gore, J., U. S. EPA	Mastrolonardo, R., SulTRAC	Email - re: WTCA Test Well Visit at West Troy Business	1
32	956252	7/7/2016	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Email - re: Field Team Sampling Wells at Local Business in the West Troy Area	1
33	956249	7/15/2016	Funderburg, T., City of Troy	Gore, J., U. S. EPA	Email - re: Follow-up Phone Call to Sultrac Discussing Business in the West Troy Area	2
34	956226	7/21/2016	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: Hobart Brothers Lagoon VAP Figures and Maps	10
35	956248	8/4/2016	Gore, J., U. S. EPA	Mastrolonardo, R., SulTRAC	Email - re: Additional Follow-up Phone Call to Sultrac Discussing Business in the West Troy Area	1

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
36	956251	8/12/2016	Gore, J., U. S. EPA	Cwik, S., U. S. EPA	Email - re: Remedial Investigation at Local Business in The West Troy Area	3
37	522736	12/12/2016	U. S. EPA	File	Environmental Indicator Worksheets (Long-Term Human Health Protection Worksheet and Migration of Contaminated Groundwater under Control Worksheet) *(This document is included by reference in the Administrative Record)*	2
38	956246	12/14/2016	Gore, J., U. S. EPA	Mastrolonardo, R., SulTRAC	Email - re: Air Sampling in The West Troy Area	2
39	933455	1/2/2017	U. S. EPA	File	Community Involvement Plan	66
40	956227	1/4/2017	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: OEPA Review of RAAR Methodology	4
41	932696	3/16/2017	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.007 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
42	956232	5/19/2017	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: OEPA Review of Remedial Investigation Report	9
43	956235	6/12/2017	Gore, J., U. S. EPA	Adams, M., Ohio EPA	Email - re: OEPA Comments on Remedial Investigation Report	21
44	935068	7/11/2017	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.008 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
45	956231	7/18/2017	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: Review of RTC on Remedial Investigation Report	9

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
46	939084	9/29/2017	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Final Remedial Investigation Report - (Attached W/Cover Letter)	2,946
47	956221	10/6/2017	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: Remedial Investigation Report	3
48	956234	10/24/2017	Gore, J., U. S. EPA	Mastrolonardo, R., SulTRAC	Email - re: Remedial Investigation Approval Letter	2
49	937252	11/9/2017	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.009 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
50	548723	1/18/2018	U. S. EPA	File	SF 135 - Site Specific Remedial Action Files	135
51	956217	3/9/2018	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: OEPA Review of Alternatives Array Memo	6
52	940965	5/10/2018	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.010 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2
53	956219	5/21/2018	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: Original Appointment of Alternatives Array Briefing	1
54	956216	6/12/2018	Adams, M., Ohio EPA	Gore, J., U. S. EPA	Email - re: Updated Figure 5-1	1
55	956247	8/7/2018	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Email - re: Troy City Engineers and Water Works Discussions	2
56	942199	8/23/2018	U. S. EPA	SulTRAC	Work Assignment Form - WA #199-RICO-B5SV-REV.011 JV-EP-S5-06-02 *(This document is included by reference in the Administrative Record)*	2

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57	956233	11/9/2018	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Email - re: OEPA West Troy Draft Feasibility Study Comment Letter with Attachments	22
58	956240	12/18/2018	Gore, J., U. S. EPA	Williams, L., Ohio EPA	Email - re: OEPA Responses to Draft Feasibility Study	14
59	956222	1/18/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Review of Finalized Feasibility Study	1
60	956236	2/13/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: RTC Call on WTCA Site	4
61	956229	3/7/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: OEPA Response to Comments on WTCA Site	9
62	956228	4/8/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Reponses to Additional OEPA Comments on Feasibility Study	4
63	956230	7/8/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Additional Responses to OEPA Comments on WTCA Site	10
64	956239	7/22/2019	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Email - re: Feasibility Study Modifications Approval	2
65	956223	7/22/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Feasibility Study Report Approval with Minor Modifications	1
66	949375	7/25/2019	Mastrolonardo, R., SulTRAC	Gore, J., U. S. EPA	Final Feasibility Study Report	321
67	956218	12/9/2019	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Comment Letter for WTCA Proposed Remedial Response	3
68	956220	1/12/2020	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: WTCA Public Meeting Plans	1
69	956255	5/29/2020	Gore, J., U. S. EPA	Bruce, D., U. S. EPA	Email - re: WTCA May 2020 Monthly Report	6

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70	469231	6/4/2020	U. S. EPA	File	Proposed Plan for Cleanup at (WTCA) Site	32
71	956225	6/5/2020	Palomeque, A., U. S. EPA	Gore, J., U. S. EPA	Email - re: WTCA Ad and Fact Sheet	11
72	956238	6/8/2020	Gore, J., U. S. EPA	File	Email - re: [Redacted] Signed Access Letters From Local Businesses	7
73	956224	6/8/2020	Williams, L., Ohio EPA	Gore, J., U. S. EPA	Email - re: Final Updated Proposed Plan and Fact Sheet	41
74	956256	6/9/2020	Gore, J., U. S. EPA	File	Email - re: WTCA Site Link to The Federal Register Final NPL Listing on 9/18/2012	4