

May 2010



**Environmental
Protection Agency**

Division of Emergency
and Remedial Response

Division of Emergency and Remedial Response

DECISION DOCUMENT

FOR THE REMEDIATION OF THE

FAYETTE TUBULAR PRODUCTS FACILITY

Fayette, Fulton County, Ohio

Prepared by

THE OHIO ENVIRONMENTAL PROTECTION AGENCY

I certify this to be a true and accurate copy of the
official documents as filed in the records of the Ohio
Environmental Protection Agency.

By: *MAS Impone* Date: 5/28/2010

ENTERED DIRECTOR'S JOURNAL

MAY 28 2010

OHIO E.P.A.

Ted Strickland, Governor
Lee Fisher, Lt. Governor
Chris Korleski, Director

DECLARATION

SITE NAME AND LOCATION

Fayette Tubular Products Facility
Fayette, Fulton County, Ohio EPA/NWDO

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial action for the former Fayette Tubular Products (FTP) manufacturing facility in Fayette, Fulton County, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency (Ohio EPA), statutes and regulations of the State of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

Actual and threatened releases of chlorinated volatile organic compounds (CVOCs) including trichloroethylene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) at the Site, if not addressed by implementing the remedial action selected in the Decision Document, constitute a substantial threat to public health or safety and are causing or contributing to air or water pollution or soil contamination. The major health and environmental risks of this Site resulted from a vapor degreaser that was formerly located and operated in the western portion of the FTP building. In addition to this primary source, Site data indicate that limited, isolated releases of industrial chemicals may have occurred in outdoor storage areas and outside of doorways.

DESCRIPTION OF THE SELECTED REMEDY

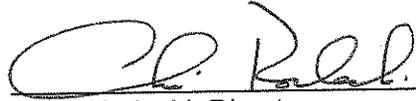
Ohio EPA's selected remedial alternative should yield a permanent solution for risks associated with the contaminated media remaining at the Site. The expectations for the selected alternative include:

- reduction of human health risks to within acceptable limits and protection of human health and the environment from exposure to contaminants of concern in the ground water, soil and surface water that are above acceptable limits;
- short- and long-term protection of public health and the environment;
- compliance with applicable statutory provisions and regulations;
- cost-effectiveness and limitation of expenses to what is necessary to achieve the expectations stated above; and,
- continued operation and maintenance of existing remedial action and monitoring systems.

The selected remedial alternative includes: institutional controls and engineering controls with natural attenuation for on-Site soils (Alternative S2); and, active in-situ bioremediation with natural attenuation and controls to address shallow groundwater (Alternative G3). Ohio EPA finds that these measures will protect public health and the environment by reducing risk to acceptable levels once the remedial action objectives have been achieved.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with legally applicable state and federal requirements, is responsive to public participation and input and is cost-effective. The remedy uses permanent solutions and treatment technologies to the maximum extent practicable to reduce toxicity, mobility and volume of hazardous substances at the Site. The effectiveness of the remedy will be reviewed regularly.


Chris Korleski, Director

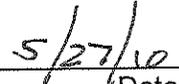

Date

TABLE OF CONTENTS

	Page Number
1.0 SUMMARY OF SITE CONDITIONS	6
1.1 Site History.....	6
1.2 Summary of the Remedial Investigation.....	7
1.2.1 Soil Contamination.....	8
1.2.2 Ground Water Contamination.....	8
1.2.3 Public Water Supply Contamination.....	9
1.3 Additional Information, Approved by the Ohio EPA, Subsequent to the Remedial Investigation.....	9
1.4 Interim or Removal Actions Taken to Date.....	9
1.4.1 Pilot Collection Sump.....	9
1.4.2 Disconnection of Agricultural Drain Tile.....	9
1.4.3 Groundwater Control System.....	10
1.4.4 Source Area Removal Action.....	10
1.4.5 Village Municipal Wells Relocation.....	10
1.4.6 Gorham-Fayette School Relocation.....	10
1.5 Summary of Site Risks and Need for Remedial Action.....	11
1.5.1 Risks to Human Health and Ecological Receptors.....	11
2.0 REMEDIAL ACTION OBJECTIVES	11
3.0 SUMMARY OF REMEDIAL ALTERNATIVES	12
3.1 On-Site Soil.....	12
3.1.1 Alternative S1 (No Action).....	13
3.1.2 Ohio EPA Modified Alternative S2 (Institutional & Engineering Controls with Natural Attenuation).....	13
3.1.3 Alternative S3 (Institutional & Engineering Controls with Natural Attenuation).....	13
3.1.4 Alternative S4 (Soil Vapor Extraction with Ex-Situ Treatment & Institutional Controls).....	14
3.2 Shallow Groundwater.....	14
3.2.1 Alternative G1 (No Action).....	14
3.2.2 Alternative G2 (Partial Containment with Institutional and Engineering Controls).....	15
3.2.2.1 Partial Containment of Shallow Groundwater.....	15
3.2.2.2 Institutional and Engineering Controls.....	16
3.2.2.3 Natural Attenuation.....	16
3.2.3 Alternative G3 (Active In-Situ Bioremediation with Natural Attenuation and Controls).....	16
3.2.3.1 Active In-Situ Bioremediation.....	17
3.2.3.2 Institutional and Engineering Controls.....	18
3.2.3.3 Natural Attenuation.....	18
4.0 COMPARISON AND EVALUATION OF ALTERNATIVES	19
4.1 Evaluation Criteria.....	19
4.2 Analyses of Alternatives for On-Site Soils.....	20

4.2.1	Alternative S1 (No Action).....	20
4.2.2	Ohio EPA Modified Alternative S2 (Institutional & Engineering Controls with Natural Attenuation)	20
4.2.3	Alternative S3 (Institutional and Engineering Controls with Natural Attenuation)	21
4.2.4	Alternative S4 (SVE with Ex-Situ Treatment and Institutional and Engineering Controls)	22
4.2.5	Comparative Summary of On-Site Soil Alternatives	23
4.3	Analysis of Alternatives for Shallow Groundwater.....	24
4.3.1	Alternative G1 (No Action).....	24
4.3.2	Alternative G2 (Partial Containment with Institutional and Engineering Controls)	24
4.3.3	Alternative G3 (Active In-Situ Bioremediation with Natural Attenuation and Controls)	25
4.3.4	Comparative Summary of Shallow Groundwater Alternatives	27
5.0	SELECTED REMEDIAL ALTERNATIVE.....	28
5.1	On-Site Soil Alternative.....	28
5.2	Shallow Groundwater Alternative.....	29
6.0	DOCUMENTATION OF SIGNIFICANT CHANGES	30
7.0	RESPONSIVENESS SUMMARY.....	31
8.0	GLOSSARY	39

LIST OF FIGURES

1	<i>Maps</i>
	1-1 <i>Location Map</i>
	1-2 <i>Site location Map</i>
2	<i>Summary of Contaminants of Concern</i>
3	<i>Area of Soil Impact</i>
4	<i>Aerial Extent of Shallow Groundwater Impact</i>
5	<i>Summary of Risks</i>
6	<i>Summary of Evaluation Criteria</i>
7	<i>Final Cleanup Levels</i>

LIST OF TABLES

ATTACHMENTS / APPENDICES

DECISION SUMMARY
Former Fayette Tubular Products Facility
Fayette, Fulton County, Ohio

1.0 SUMMARY OF SITE CONDITIONS

1.1 Site History

The former Fayette Tubular Products (FTP) manufacturing facility is located in Gorham Township (Section 20, Township 9 South, Range 1 East) at Railroad and Gamber Streets in Fayette, Fulton County, Ohio (see Figure 1-1), approximately 45 miles west of Toledo, Ohio (Site). The rectangular-shaped FTP property is approximately 12 acres in size, completely fenced, and bounded on the west by Gamber Street, on the north by County Road S, on the east by Park Street and on the south by the Village of Fayette High School and Pre-School facilities and the Village Park. The former FTP facility is separated from the school grounds by roughly 100 feet. Commercial and industrial facilities are located to the east and west of the FTP property, with agricultural areas to the north. Residential areas exist in the immediate vicinity of the FTP property, west and southwest of Gamber Street.

The former FTP facility (see Figure 1-2) consisted of a single, large building of approximately 139,000 square feet, which housed manufacturing and office operations. The area was originally developed in the early 1960s. Manufacturing operations at FTP, which involved fabrication of tubular metal parts (air conditioning components), began in 1962. A vapor degreaser was formerly located and operated in the western portion of the building. In addition to soil and ground water contamination resulting from the vapor degreasing operations, Site data indicate that isolated releases of industrial chemicals may have occurred in outdoor storage areas and outside of building doorways.

The facility was operated continuously through 1997 when FTP ceased operations and closed the plant. In 1996, FTP merged out of existence into Hutchinson FTS, Inc. On that same date, D. H. Holdings Corporation (DHHC) entered into an indemnification agreement with Hutchinson FTS, Inc., whereby DHHC assumed the environmental liabilities associated with the former FTP property. A local developer purchased the FTP property and building and has since renovated and leased the building for industrial and warehousing operations.

The chemicals of concern are as follows:

On-Site Soils: Trichloroethene (TCE); 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethane (1,2-DCA); vinyl chloride and tetrachloroethene (PCE) are considered chemicals of concern because they drive the current baseline human health risks due to on-Site soil impacts.

On-Site Shallow Groundwater: TCE is considered the primary chemical of concern because it drives the current baseline human health risks due to on-Site groundwater impacts. In addition, although 1,1-DCE; 1,2-DCA and vinyl chloride do not currently appear to be risk drivers for on-Site groundwater exposure pathways, they are also included as chemicals of concern for on-Site shallow groundwater because of the potential for TCE to decay into these compounds.

Off-Site Shallow Groundwater: TCE is the primary risk driver for off-Site shallow groundwater. In addition, all chemicals detected in off-Site shallow groundwater that are attributable to historical operations at the FTP Site are considered chemicals of concern.

Village Municipal Aquifer: For the village municipal aquifer, vinyl chloride is the chemical of concern because it is the only chemical that has been detected in the former Village water supply wells above its corresponding maximum contaminant level (MCL).

Table 1-1: Chemicals of Concern

Chemical	Media			
	On-Site Soil	On-Site Shallow Groundwater	Off-Site Shallow Groundwater	Deep Groundwater
Trichloroethene	X	X	X	
1,1-Dichloroethane	X	X	X	
1,2-Dichloroethane	X	X	X	
Vinyl Chloride	X	X	X	X
Tetrachloroethene	X			
1,1,1-Trichloroethene			X	
1,1-Dichloroethene			X	
cis-1,2-Dichloroethene			X	
trans-1,2-Dichloroethene			X	

1.2 Summary of the Remedial Investigation

The remedial investigation (RI) was conducted by D. H. Holdings and included a number of tasks to identify the nature and extent of Site-related chemical contaminants. The investigation was conducted with oversight by Ohio EPA and was approved on September 14, 2004. The tasks included sampling of soil, ground water and indoor and outdoor air. The data obtained from the investigation were used to conduct a baseline risk assessment (*i.e.*, an evaluation of the risks to humans and the environment posed by a site) and to determine the need to evaluate remedial alternatives. This Preferred Plan contains only a brief summary of the findings of the RI and feasibility studies (FS). Please refer to the RI and FS Reports for additional information on contaminant concentrations. These reports are located in the public repository and in Ohio EPA's Northwest District Office.

Interviews with former FTP personnel identified the past use of a vapor degreaser to degrease equipment and metallic components that were manufactured in the facility. The degreaser was installed in a sub-grade, concrete-lined pit located in a wing formerly extending outward from the western wall of the building. Chlorinated solvents were used in the degreaser from 1964 to 1982. The location of this wing is shown on Figure 1-2. In 1982, the degreaser was dismantled, and the sub-grade degreaser pit was backfilled with clean sand to grade and finished with concrete. A hot water-based degreasing unit was installed aboveground in 1982, in the same location as the former solvent degreaser, to replace the Detrex solvent degreaser. This degreasing unit was in operation until the plant closed in 1997.

In 1994, an underground storage tank (UST) was discovered at the southwest corner of the building and the Bureau of Underground Storage Tank Regulation (BUSTR) was notified immediately for recording purposes. The UST had a 4,000-gallon capacity and had previously stored heating oil for the plant. The UST was removed in 1994 under the supervision of a qualified UST consultant adhering to BUSTR procedures and protocols.

A RI Report was submitted to the Ohio EPA in April 1997, which chronicled investigations performed at the Site and presented a baseline risk assessment. Comments on this report were submitted by Ohio EPA in July 1999 and, among other issues, addressed the need for additional investigation to further delineate impacts at and in the vicinity of the Site.

From 1996 through August 2001, several interim remedial actions were implemented at the Site to reduce migration of shallow groundwater off-Site and to remove source area soils from the Site. These actions are described in Section 3.2 of this document.

An RI Report Addendum was submitted to Ohio EPA on July 18, 2000, and described additional soil and groundwater sampling events as well as presented updated risk assessment information. Ohio EPA responded with comments on the 2000 RI Report Addendum in August 2000.

On January 31, 2002, D. H. Holdings Corporation entered into a Consent Order with the State of Ohio to perform RI/FS activities at the Site. Since that time, additional soil and groundwater investigations have been completed in accordance with the approved RI/FS Workplan submitted to Ohio EPA in March 2002.

The nature and extent of contamination in each environmental medium and the contaminants of concern attributable to the Site are described below.

1.2.1 Soil Contamination

Based on the findings of the RI and the baseline risk assessment, soil impacts are limited to on-Site areas and are mainly found in an area around the former degreaser area. These impacted soils pose potential health risks to industrial workers and to construction and utility workers on the FTP property. Based on a review of the results of the baseline risk assessment, the chemicals of concern are: TCE, 1,1-DCE; 1,2-DCA; vinyl chloride; and PCE.

The area of soil impacts to be addressed, as outlined in the FS, is depicted in Figure 2. Other chemicals have been detected, but do not significantly contribute to human health risks. The area of soil impacts covers approximately 110,000 square feet, of which about 70,000 square feet are beneath the building footprint and the remaining 40,000 square feet are outside of, but close to, the building footprint. Assuming an average vadose zone thickness of 8 feet, this area represents approximately 32,590 cubic yards of soil to be remediated or managed to prevent exposure.

1.2.2 Ground Water Contamination

Shallow groundwater, located at 7 to 8 feet below the ground surface and impacted by CVOCs, is present both on-Site and off-Site. The impacted shallow groundwater poses a health risk to construction and utility workers. In addition, although shallow groundwater impacts do not currently pose a human health risk for workers on the Site, or residents or school occupants, the future potential of these exposure pathways must be considered and potential receptors protected. Chemicals of concern in shallow groundwater are: TCE; 1,1-DCE; 1,2-DCA; vinyl chloride; 1,1,1-TCA; 1,1-DCA; cis-1,2-DCE; and trans-1,2-DCE.

Figure 3 depicts the aerial extent of shallow groundwater impacts both on and off the former FTP facility. The RI revealed groundwater impacts west of the facility that are not attributable to the FTP Site. These impacts are located just west of a line running mid-way between Gamber and Ohio Streets and are depicted by light gray contours. Although the source of these impacts is unknown, it is believed that they are not related to the FTP Site because they are located cross-gradient from the Site and are part of a discontinuous pattern of impacts.

The delineated area of shallow groundwater impacts covers an area of approximately 262,000 square feet (about 205,000 square feet on-Site and about 57,000 square feet off-Site). Assuming an average saturated thickness of 6 feet, a volume of impacted media can be calculated for the purposes of comparing remedial alternatives during the FS. This approach yields a total volume of approximately 58,000 cubic yards of saturated soil, of which 45,500 cubic yards are on-Site and 12,500 cubic yards are off-Site. Assuming a typical porosity of 0.25, the pore volume of impacted groundwater within this area can be estimated at 2.9 million gallons, with 2.3 million gallons on-Site and 0.6 million gallons off-Site.

1.2.3 Public Water Supply Contamination

Vinyl chloride contamination was present in the former location of the Village municipal water supply wells; however, no chemical plume was found in the municipal water supply aquifer. Aeration of groundwater from the former Village municipal wellfield location prior to distribution was effective in keeping concentrations of vinyl chloride below MCLs in the finished water supply. No estimate was made with regard to volume or extent of impact due to the lack of a discernible plume.

1.3 Additional Information, Approved by the Ohio EPA, Subsequent to the Remedial Investigation

Since 1996, several interim actions have been implemented at the Site, including installation and operation of multiple groundwater collection systems with on-Site activated carbon treatment. These actions were anticipated to be an important consideration in the development of a recommended final action, as significant capital and operational expenses have been invested in these actions.

Additional information obtained by Ohio EPA is located in the public repository and in the Northwest District Office of Ohio EPA.

1.4 Interim or Removal Actions Taken to Date

1.4.1 Pilot Collection Sump

Since September 1996, a pilot groundwater collection sump (FI-1) has been operated at the former FTP property. Groundwater collected from the sump is treated using an activated carbon treatment system and discharged to the Village sewer system, in accordance with an Indirect Discharge Permit. This sump was installed south of the former degreaser area as a pilot test to evaluate the effectiveness of such systems in controlling shallow groundwater.

1.4.2 Disconnection of Agricultural Drain Tile

A second collection sump was installed in September 1997 to intercept a section of the drain known as Gorham Ditch Improvement No. 1149, which was determined to be a likely pathway for migration of chemical constituents in shallow groundwater to the southeast of the former FTP

facility. Operation of the sump allows for the collection of groundwater from the portion of the drain that crosses beneath the FTP facility to the northwest. Additionally, interception of this flow prevents the drain from transporting potentially impacted groundwater off-Site to the southeast.

1.4.3 Groundwater Control System

In November 2000, construction was completed on a groundwater control system (GCS) on the southwestern portion of the facility. The primary objective of the GCS is to intercept impacted groundwater in the shallow saturated zone along the western part of the facility's southern boundary and to prevent further off-property migration of impacted groundwater. Although the installation of the GCS was performed under a unilateral order from Ohio EPA, an interim action work plan was previously submitted to and later approved by Ohio EPA.

1.4.4 Source Area Removal Action

Based on a review of the analytical soil and groundwater data, indirect evidence supported the potential for NAPL to be present in soils in the vicinity of the former degreaser area. Based on this information, D. H. Holdings, under the supervision of Ohio EPA, removed the former degreaser pit structure and the source area soils in the vicinity of the former degreaser area in August 2001. The area around the former vapor degreaser is referred to as the source area because of the historical use of chlorinated solvents in that area and the high concentrations of trichloroethylene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) that were encountered in soils. The removal action was based on information and performed in accordance with reports and plans previously submitted to and reviewed by Ohio EPA.

Prior to removal activities, the building wing formerly containing the vapor degreaser was demolished and removed to provide access for heavy equipment. The focus of the source soil removal action was to eliminate the potential for a continuing source of groundwater contamination. Under the action, approximately 1,632 tons of soil were excavated, loaded into trucks, and shipped off-Site for disposal. Impacted soils in the southeastern courtyard were also excavated and disposed of during this removal action. Prior to backfilling, a drainage system consisting of perforated drains connected to a fourth sump (FS-4) was installed in the excavation cavity. Groundwater collected from FS-4 is pumped to and treated by the existing treatment system, as is the practice with other groundwater collection sumps at the Site. Operation of the FS-4 enhances hydraulic control of shallow groundwater in the most impacted area of the Site.

1.4.5 Village Municipal Wells Relocation

As a precautionary measure, D. H. Holdings completed the relocation of the Village water supply wells to an up-gradient and deeper aquifer, known as the Brawley Aquifer in November 2006. The previous water supply location was impacted by vinyl chloride but municipal water treatment procedures (i.e., an aerator) were effective in removing the contamination. As a result of the aeration, public safety was not endangered and Ohio EPA did not require relocation of the municipal water supply wells.

1.4.6 Gorham-Fayette School Relocation

Similar to the precautionary relocation of the Village water supply wells, D.H. Holdings and the Village of Fayette School Board entered into an agreement that led to construction of a new school facility in 2008. As a part of this agreement, the Village of Fayette School Board would

be barred from using the acreage that comprised the former Gorham-Fayette School for any purpose other than "green space." Demolition of the former Gorham-Fayette School was initiated in 2008 and completed in early 2009.

1.5 Summary of Site Risks and Need for Remedial Action

A baseline risk assessment was conducted to evaluate potential risks to human and ecological receptors from chemical impacts identified at and around the Site. A detailed discussion of the methods and findings of the baseline human health risk assessment is contained in the approved RI Report.

1.5.1 Risks to Human Health and Ecological Receptors

For purposes of the baseline risk assessment, all chemicals evaluated at the Site were included in the risk calculations, regardless of whether or not they are related to historical Site operations. However, it was necessary in the FS to identify the subset of all measured chemicals that drive the current and future potential human health risks, and which are attributable to historical releases from industrial operations.

The chemicals that are driving these risks, and that are likely attributable to historical releases, are the chemicals of concern for the Site. Identification of these chemicals is a necessary prerequisite to identifying potentially applicable remedial technologies and process options, as well as for developing and screening remedial alternatives. The general procedure used for identifying chemicals of concern is included in the FS.

The chemicals of concern are as follows:

On-Site Soils: TCE; 1,1-DCE; 1,2-DCA; vinyl chloride and PCE are considered chemicals of concern because they drive the current baseline human health risks due to on-Site soil impacts.

On-Site Shallow Groundwater: TCE is considered the primary chemical of concern because it drives the current baseline human health risks due to on-Site groundwater impacts. In addition, although 1,1-DCE; 1,2-DCA and vinyl chloride do not currently appear to be risk drivers for on-Site groundwater exposure pathways, they are also included as chemicals of concern for on-Site shallow groundwater because of the potential for TCE to decay into these compounds.

Off-Site Shallow Groundwater: TCE is the primary risk driver for off-Site shallow groundwater. In addition, all chemicals detected in off-Site shallow groundwater that are attributable to historical FTP operations are considered chemicals of concern.

2.0 REMEDIAL ACTION OBJECTIVES

A FS was conducted by D. H. Holdings to define and analyze appropriate remedial alternatives. The FS was conducted with oversight by Ohio EPA and was approved on March 28, 2006. The RI and FS are the basis for the selection of Ohio EPA's preferred remedial alternative.

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with the National Contingency Plan (NCP). The RAOs are goals that a remedy should achieve in order to ensure the protection of human health and the environment. The goals are designed specifically to mitigate the potential adverse effects of Site contaminants present in the environmental media.

Preliminary Remediation Goals (PRGs) for the protection of human health were established using the acceptable excess lifetime cancer risk and non-cancer hazard goals identified in the Division of Emergency and Remedial Response (DERR) Technical Decision Compendium (TDC) document "Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for DERR Remedial Response and Federal Facility Oversight," dated April 26, 2004. These goals are given as 1E-5 (*i.e.*, 1 in 100,000) excess lifetime cancer risk and a hazard index of 1, and were established using the default exposure parameters provided by U.S. EPA or Site-specific information. The TDC can be found at <http://www.epa.ohio.gov/portals/30/rules/riskgoal.pdf>.

The carcinogenic risk level refers to the increased likelihood that someone exposed to chemicals from the Site would develop cancer during his or her lifetime as compared with a person not exposed to the Site. For example, a 1 in 100,000 (equal to 1/100,000 or 1E-5) risk level means that if 100,000 people were chronically exposed to a carcinogen at the specified concentration, then there is a probability of one additional case of cancer in this population. Note that the risks refer only to the incremental risks created by exposure to the chemicals at the Site. They do not include the risks of cancer from other non-Site related factors to which people could be exposed in their lifetime (*e.g.*, smoking, poor diet). Non-carcinogenic hazards are generally expressed in terms of a hazard quotient (HQ) or index (HI), which combines the concentration of chemical exposures with the toxicity of the chemicals (quotient refers to the effects of an individual chemical whereas index refers to the combined effects of all chemicals). A hazard index of 1 represents the exposure at which no harmful effects are expected.

According to U.S. EPA, the RAOs consist of medium-specific goals for protecting human health and the environment. The objectives should be as specific as possible but not so specific that a range of alternatives that can be developed is unduly limited. The RAOs for the FTP Site pertain to the environmental media and chemicals of concern as identified above. The RAOs also address exposure routes and receptors. Based on the results of the baseline risk assessment, the RAOs developed for the Site include:

- **RAO #1:** Reduce or eliminate exposure to contaminated soil to ensure use of the FTP property for industrial purposes.
- **RAO #2:** Prevent infiltration of and exposure to vapors from the ground water plume underlying the FTP building, by establishing an inspection, maintenance and repair program for this facility.
- **RAO #3:** Reduce or eliminate direct exposure to contaminated ground water by containing and treating the areas of shallow ground water with the highest CVOC concentrations (areas exceeding 1,000 µg/l) until monitoring demonstrates that the concentrations no longer pose an unacceptable threat to human health.

3.0 SUMMARY OF REMEDIAL ALTERNATIVES

A total of seven (7) remedial alternatives were considered, four for on-Site soils, and three for shallow groundwater. A brief description of the major features of each remedial alternative follows. More detailed information about each remedial alternative can be found in the FS.

3.1 On-Site Soil

The final alternatives retained for detailed analysis for on-Site soils include:

- Alternative S1: No Action
- Alternative S2: Institutional and Engineering Controls with Natural Attenuation (as modified by Ohio EPA)
- Alternative S3: Institutional and Engineering Controls with Natural Attenuation
- Alternative S4: Soil Vapor Extraction with Ex-Situ Treatment and Institutional Controls

3.1.1 Alternative S1 (No Action)

This alternative involves no further remedial actions for on-Site soils. RAOs are assumed to be met and on-Site soils are assumed not to pose a threat to human health now or in the future. Based on the results of the baseline risk assessment, this is not the case. However, the no action alternative is retained to provide a baseline for comparison to other alternatives. It would not include institutional controls such as deed restrictions or monitoring, nor additional interim actions or contingency plans. It is assumed that any existing institutional controls would remain in place, but interim actions currently being operated at the Site would be terminated. It is assumed that natural attenuation would reduce chemical concentrations in soils over time. However, the alternative does not include a provision for monitoring, ongoing data analysis or periodic Site review.

3.1.2 Ohio EPA Modified Alternative S2 (Institutional and Engineering Controls with Natural Attenuation)

This alternative was modified by Ohio EPA to incorporate institutional controls as well as engineering controls in order to address current potential exposure risks due to on-Site soil impacts. It is assumed that these controls are sufficient to protect the health of industrial, construction and utility workers on the FTP property. Under this alternative, controls would be maintained until it can be demonstrated that natural attenuation has reduced concentrations of chemicals of concern to levels that no longer pose unacceptable human health risks. The following institutional controls are included in this alternative:

- A restriction regarding subsurface activities within impacted areas would be applied to the property, ensuring that such activities would be performed under the supervision of individuals with an understanding of the subsurface environmental conditions and the potential threats. As necessary, a Site-specific health and safety plan would be required, ensuring property measures are in place to protect health and safety.
- A restriction would prohibit the relocation of soils from within impacted areas to ensure that excavated soils from the area of impacts are characterized and disposed of properly.
- A land-use restriction would be applied to the property to maintain its current industrial land use.
- A program of floor inspection, maintenance and repair would be implemented at the FTP building to prevent infiltration of chemical vapors from soil beneath the building.

3.1.3 Alternative S3 (Institutional and Engineering Controls with Natural Attenuation)

This alternative is similar to Alternative S2 except that in this alternative, the air handling equipment at the FTP building would be upgraded to increase the turnover rate of air inside the building. This alternative assumes that these controls would be maintained until it can be demonstrated that natural attenuation has reduced concentrations of chemicals of concern to levels that no longer pose unacceptable human health risks.

3.1.4 Alternative S4 (Soil Vapor Extraction with Ex-Situ Treatment and Institutional Controls)

In this alternative, vadose zone soils in the vicinity of the former degreaser (and outside the limits of the source area removal) would undergo active remediation through the installation and operation of SVE wells. This alternative relies on the same institutional controls and engineering controls that are included in Alternative S2, to manage current and potential exposures until active remediation is completed. The following institutional controls and engineering controls are included in this alternative:

- A restriction regarding subsurface activities within impacted areas would be applied to the property. Under the restriction, subsurface activities in this area would be performed only under the supervision of qualified individuals with an understanding of the subsurface environmental conditions and the potential threats. As necessary and appropriate, a Site-specific health and safety plan would be required for subsurface work, ensuring proper measures are in place to protect worker health and safety.
- A restriction prohibiting the relocation of soils from within the area of impacts would be applied to the property. It would ensure that any excavated soils from the area of impacts are properly characterized and disposed of.
- A land use restriction would be applied to the site to maintain its current industrial land use.
- An operations and maintenance program comprised of floor inspection, maintenance, and repair would be implemented at the former FTP building to prevent infiltration of chemical vapors from soil beneath the building.

3.2 Shallow Groundwater

The final alternatives retained for detailed analysis for shallow groundwater are as follows:

- Alternative G1: No Action
- Alternative G2: Partial Containment with Institutional and Engineering Controls
- Alternative G3: Active In-Situ Bioremediation with Natural Attenuation and Controls.

3.2.1 Alternative G1 (No Action)

The no action alternative involves no further remedial actions for shallow groundwater. It assumes that RAOs are being met and that shallow groundwater does not pose a threat to human health now or in the future. Based on the results of the baseline risk assessment, this is not the case. However, the no action alternative is retained to provide a baseline comparison to other alternatives.

Under this alternative, all interim actions currently operating at the Site would be terminated. No institutional controls would be implemented. It is assumed that natural attenuation would reduce chemical concentrations in shallow groundwater over time, but the alternative does not include any provision for monitoring, ongoing data analysis or periodic Site review.

3.2.2 Alternative G2 (Partial Containment with Institutional and Engineering Controls)

Under this alternative, shallow groundwater with the highest CVOC concentrations would be contained to prevent further migration. This alternative relies on institutional and engineering controls to address current exposure risks due to shallow groundwater impacts on-Site. It is assumed that these controls are sufficient to protect the health of industrial, construction and utility workers on the FTP property, now and into the future. Controls would be maintained until it can be demonstrated that natural attenuation and the removal action of the hydraulic containment system have reduced concentrations of chemicals of concern to levels that no longer pose unacceptable human health risks.

3.2.2.1 Partial Containment of Shallow Groundwater

Under this alternative, shallow groundwater with the highest concentrations of CVOCs would be contained and prevented from spreading off-Site. The conceptual design for the shallow groundwater containment system utilizes buried drain-and-media trenches to impose hydraulic control on shallow groundwater. This system of hydraulic control was selected over geotechnical barrier control for the following reasons:

- A trench-and-media hydraulic control system has been operated as an interim action at the FTP Site for several years and has proven effective in controlling shallow groundwater;
- A partial containment system that utilizes the system currently in place is more economical than construction of a geotechnical barrier;
- In addition to containment, the hydraulic containment system will remove chemical mass over time, unlike a geotechnical barrier; and,
- A geotechnical barrier would have to be keyed into the clay-silt layer underlying the upper saturated sand layer, which would present the risk of breaching the clay-silt layer.

A computer model was developed to simulate groundwater flow in the upper saturated sand layer in order to develop a preliminary design for the hydraulic containment system and to evaluate its effectiveness. The model was developed using Visual MODFLOW. The groundwater flow model was calibrated to actual static groundwater measurements to simulate the current groundwater containment system. The particle-tracking feature of the model was then used to delineate the capture zone of the system.

Based on this analysis, the model was used to evaluate the effectiveness of extending the current system. The layout of the groundwater control system extension was driven by two major factors:

- The presence of Gamber Road and buried utilities directly west of the existing groundwater control system make westward extension of the system an unattractive option.

- The extended system will contain the most concentrated shallow groundwater impacts in the property that previously served as the location of the former Gorham-Fayette School.

These factors indicate that an extension of the existing system onto the former Gorham-Fayette School location would be preferable if it could be demonstrated that such a system would provide effective overall containment. The groundwater model was used to evaluate the effectiveness of a system that consisted of the current system and an extension onto the former school location. The model results indicate that this system would be effective at containing the most concentrated CVOC impacts, as well as preventing deterioration of groundwater quality at the former Gorham-Fayette School location.

3.2.2.2 Institutional and Engineering Controls

As mentioned above, this alternative relies on institutional and engineering controls to manage current and potential exposures. The following institutional and engineering controls are included in this alternative:

- A restriction would be applied to the former FTP property prohibiting subsurface activities within impacted areas. Subsurface activities in the impacted areas would be performed under the supervision of individuals with an understanding of the subsurface environmental conditions and the potential threats. As necessary, a Site-specific health and safety plan would be required for subsurface work to ensure proper measures are in place to protect worker health and safety.
- A land-use restriction would be applied to the former FTP property to maintain its current industrial land use.
- A program of floor inspection, maintenance and repair would be implemented at the former FTP building to prevent infiltration of chemical vapors from groundwater beneath the building.

3.2.2.3 Natural Attenuation

Because this alternative does not fully contain all shallow groundwater impacts, it is understood that some shallow groundwater downgradient of the containment system capture zone may continue to migrate. Groundwater data indicate that natural attenuation is occurring, as evidenced by the presence of dichloroethane, dichloroethene and vinyl chloride, which are decay products of TCE.

To evaluate the potential for natural attenuation of residual off-Site CVOCs under this alternative, the USEPA BIOCHLOR model was used to simulate the fate of CVOCs downgradient of the containment system capture zone. The model was used with theoretical, literature-based decay chemical parameters, such as decay rates and hydrogeological parameters based on Site data and analysis. The results of this modeling exercise indicate that concentrations of CVOCs in shallow groundwater, downgradient of the containment system, will be reduced to their respective safe drinking water MCLs in approximately 300 years. The model predicts that, during that time, the impacts will migrate a maximum distance of approximately 1,050 feet.

3.2.3 Alternative G3 (Active In-Situ Bioremediation w/Natural Attenuation & Controls)

This alternative is similar to Alternative G2 except that active in-situ bioremediation is used to remediate CVOCs in the area with the highest CVOC concentrations, rather than relying on containment. Like G2, this alternative uses institutional and engineering controls to address current exposure risks posed by shallow groundwater impacts on-Site. It is assumed that these controls are sufficient to protect the health of industrial, construction and utility workers on the FTP property until active remediation reduces CVOCs on-Site to concentrations that no longer pose unacceptable risks. The components of this alternative are described in further detail below.

3.2.3.1 Active In-Situ Bioremediation

This alternative uses active in-situ bioremediation to aggressively reduce the highest CVOC concentrations in shallow groundwater, centered roughly in the southwestern portion of the former FTP property. The area within the 1,000 µg/l total VOC contour was delineated as the target area for in-situ bioremediation.

Three potential technologies were retained for consideration after the technology screening presented in the FS: in-situ bioremediation, in-situ chemical oxidation (ISCO) and phytoremediation. Detailed discussions of these technologies are presented in the FS. For purposes of remedial alternative development, bioremediation was selected over ISCO and phytoremediation for the following reasons:

- Direct injection of chemical oxidants is generally more effective than upgradient injection because it reduces the potential for oxidants to be consumed by non-contaminant sources such as naturally-occurring chemical oxygen demand (COD). However, direct injection requires a network of injection points covering the target area. In the case of the FTP Site, much of this area is beneath the former FTP building, making direct injection extremely difficult, if not impossible.
- Likewise, phytoremediation requires accessible areas for implementation. As much of the area of impacts is beneath the FTP building, this access does not exist.
- In general, bioremediation has lower capital cost than ISCO, although remedial duration can be longer. Although this remedial alternative assumes in-situ bioremediation, final selection of the in-situ technology for the FTP Site would depend on bench-, pilot- and field-scale testing. Previous experience from an ISCO pilot study indicates that the saturated zone soils at the FTP plant location consist primarily of very fine sands, silts and some clay with relatively low hydraulic conductivity.

The in-situ bioremediation system for the FTP Site would likely consist of an injection gallery or trench located upgradient of the target area through which the appropriate amendments would be added to the upper saturated sand layer. Natural groundwater flow, augmented by the slight gradient increase caused by the injection system, would carry these amendments through the target area. A shallow groundwater containment system located downgradient would collect treated groundwater and either re-circulate it through the treatment zone or discharge it elsewhere. Downgradient collection is necessary for two reasons:

- The injection of chemical or biological amendments may create an increased groundwater gradient, accelerating the flow of groundwater and, potentially, the movement of CVOCs, leading to increased downgradient spreading of impacts.

- The breakdown of TCE will ultimately lead to the production of vinyl chloride, which is more mobile and toxic in groundwater and also more recalcitrant to treatment. Downgradient collection would contain residual vinyl chloride. It is assumed that the existing hydraulic containment systems would provide adequate downgradient collection under this alternative.

There are four major categories of amendments that are possible (USEPA, 2000):

- *Nutrients* – Nutrients consist of nitrogen, phosphorus or other naturally-occurring substances that facilitate microbial growth and activity, but that may be deficient in the subsurface. Nutrient addition can support both aerobic oxidation and anaerobic reductive de-chlorination.
- *Electron Donors* – Electron donor addition involves the addition of a chemical substrate that provides electrons in the redox reaction that occur during the breakdown of chlorinate compounds. Possible electron donors include toluene, methane and propane, which are oxidized by microorganisms along with the chlorinated target compounds. The direct addition of hydrogen or hydrogen-releasing compounds can act as direct reductants.
- *Electron Acceptors* – Electron acceptor addition refers to the addition of oxygen or other oxidant, such as nitrate, to support microbial breakdown of chlorinated compounds. Oxygen would be suitable for aerobic systems, whereas nitrate would be suitable for anaerobic systems.
- *Bioaugmentation* – This refers to the addition of supplement microorganisms to the subsurface.

The nature of the amendments that are added to stimulate in-situ bioremediation would be determined during the pre-design phase, through bench-, pilot- and field-scale testing. Identification of the specific amendment(s) to be added was not necessary to evaluate the alternative.

3.2.3.2 Institutional and Engineering Controls

This alternative relies on the same institutional and engineering controls as are included in Alternative G2 to manage current and potential exposures until active remediation is completed.

3.2.3.3 Natural Attenuation

Like Alternative G2, this alternative does not address all shallow groundwater impacts, but instead assumes that some shallow groundwater downgradient of the capture zone of the containment system may continue to migrate. As discussed above, groundwater data support the observation that natural attenuation has been occurring already.

The BIOCHLOR model was used to simulate the fate of CVOCs downgradient of the contaminant system capture zone for this alternative, as with the previous alternative. The results of this modeling exercise indicate that, under this alternative, concentrations of CVOCs in shallow groundwater downgradient of the containment system would eventually be reduced to their respective safe drinking water maximum contaminant levels. The model predicts that, during that time, the impacts would migrate approximately 1,050 feet at which point the plume will stabilize and further migration will not occur.

4.0 COMPARISON AND EVALUATION OF ALTERNATIVES

4.1 Evaluation Criteria

In selecting a remedy for a contaminated site, Ohio EPA considers the following eight evaluation criteria as outlined in U.S. EPA's NCP promulgated under CERCLA (40 CFR 300.430):

1. *Overall protection of human health and the environment* – Remedial alternatives shall be evaluated to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants or contaminants present at the site.
2. *Compliance with all applicable or relevant and appropriate requirements (ARARs)* – Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements of state and federal environmental laws.
3. *Long-term effectiveness and permanence* – Remedial alternatives shall be evaluated to determine the ability of a remedy to maintain reliable protection of human health and the environment over time once pollution has been abated and RAOs have been met. This includes assessment of the residual risks remaining from untreated wastes, and the adequacy and reliability of controls such as containment systems and institutional controls (*i.e.*, environmental covenant).
4. *Reduction of toxicity, mobility or volume through treatment* – Remedial alternatives shall be evaluated to determine the degree to which recycling or treatment are employed to reduce toxicity, mobility or volume, including how treatment is used to address the principal threats posed by the site.
5. *Short-term effectiveness* – Remedial alternatives shall be evaluated to determine the following: (1) short-term risks that might be posed to the community during implementation of an alternative; (2) potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) time until protection is achieved.
6. *Implementability* – Remedial alternatives shall be evaluated to determine the ease or difficulty of implementation and shall include the following as appropriate: (1) technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions); and (3) availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.
7. *Cost* – Remedial alternatives shall evaluate costs and shall include the following: (1) capital costs, including both direct and indirect costs; (2) annual operation and

maintenance costs (O&M); and (3) net present value of capital and O&M costs. The cost estimates include only the direct costs of implementing an alternative at the site and do not include other costs, such as damage to human health or the environment associated with an alternative. The cost estimates are based on figures provided by the Feasibility Study.

8. *Community acceptance* – Remedial alternatives shall be evaluated to determine which of their components interested persons in the community support, have reservations about, or oppose.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative that has accomplished the goal of protecting human health and the environment and has complied with the law. Any acceptable remedy must comply with both of these criteria. Evaluation Criteria 3 through 7 are the balancing criteria used to select the best remedial alternative(s) identified in the Preferred Plan. Evaluation Criteria 8 is a modifying criterion that is evaluated through public comments on the alternatives received during the comment period.

4.2 Analysis of Alternatives for On-Site Soils

In this section, each of the alternatives for on-Site soils is evaluated using the seven evaluation criteria outlined at the beginning of this chapter. Discussions are focused on the characteristics of each individual alternative, rather than how each alternative compares with others.

4.2.1 Alternative S1 (No Action)

An evaluation of this alternative is presented in this section in the context of evaluation criteria 1 through 7 outlined above.

Overall Protection of Human Health and the Environment – This alternative does not provide overall protection of human health because the Site-specific risk assessment indicates that concentrations of chemicals of concern in on-Site soils pose a potential threat to the health of construction or utility workers at the Site. One chemical of concern in soil was estimated to have a hazardous index exceeding one (TCE). Five compounds have excess lifetime cancer risks exceeding 1×10^{-4} (TCE; 1,2-DCA; 1,1-DCE; vinyl chloride; and tetrachloroethene). As criteria 1 is a threshold criterion and is not met, additional evaluation of this alternative is not necessary.

4.2.2 Ohio EPA Modified Alternative S2 (Institutional and Engineering Controls with Natural Attenuation)

An evaluation of Ohio EPA Modified Alternative S2 is presented in this section in the context of the seven evaluation criteria outlined above.

Overall Protection of Human Health and the Environment – Under Ohio EPA Modified Alternative S2, soil impacts in excess of PRGs would persist, but exposure of potential receptors to soils would be managed through institutional and engineering controls. Over time, the CVOCs in soil will degrade, as evidenced by the degradation of primary compounds already observed. Institutional and engineering controls will be maintained until it can be demonstrated through sampling and analysis that they are no longer necessary to protect human health. Until that time, the institutional and engineering controls identified in this alternative are expected to provide overall protection of human health. No threats to ecological receptors have been identified; therefore, this remedial alternative provides overall protection of the environment.

Compliance with ARARs – No chemical-specific, location-specific or action-specific ARARs were identified which would apply to this alternative.

Long-Term Effectiveness and Permanence – As discussed above, it is assumed that chemical concentrations would eventually be reduced to acceptable levels through natural attenuation under this alternative. Because the formation of chlorinated volatile organics such as the chemicals of concern in soil is not known to occur in nature, it can be assumed that natural attenuation processes are permanent. In addition to the irreversibility of natural attenuation processes, the institutional and engineering controls to protect human health can be maintained indefinitely; therefore, this alternative provides long-term effectiveness.

Reduction of Toxicity, Mobility or Volume Through Treatment – This alternative provides for the reduction of toxicity and volume of contaminants through natural attenuation. No provision is included to address mobility.

Short-Term Effectiveness – Ohio EPA Modified Alternative S2 uses institutional and engineering controls to protect industrial, construction and utility workers in the short term.

Implementability – The institutional controls on which this alternative relies are commonly used strategies and have been widely applied at other sites with soil impacts. Similarly, the engineering controls are commonly used remedial techniques used to mitigate potential adverse contaminant exposure.

Cost – This alternative does not require any capital investment for new construction. However, it would require administrative costs to implement the institutional controls. There would also be costs associated with establishing an initial floor inspection and repair program. Ongoing (annual) costs would be incurred to implement the floor program which would include soil sampling activities to monitor the progress of the natural attenuation anticipated to be occurring.

4.2.3 Alternative S3 (Institutional & Engineering Controls with Natural Attenuation)

Alternative S3 is presented below, using the seven evaluation criteria outlined above.

Overall Protection of Human Health and the Environment – Alternative S3 includes all of the institutional and engineering controls that Ohio EPA Modified Alternative S2 includes, and therefore provides overall protection of human health and the environment.

Compliance with ARARs – No chemical-specific, location-specific or action-specific ARARs were identified which would apply to this alternative.

Long-Term Effectiveness and Permanence – Because Alternative S3 is essentially Ohio EPA Modified Alternative S2 with an additional engineering control added, it also provides long-term effectiveness and permanence.

Reduction of Toxicity, Mobility or Volume Through Treatment – Like Ohio EPA Modified Alternative S2, this alternative provides for the reduction of toxicity and volume of contaminants through natural attenuation. No provision is included to address mobility.

Short-Term Effectiveness – Alternative S3 uses the same institutional and engineering controls as Ohio EPA Modified Alternative S2 to protect industrial, construction and utility workers in the short term.

Implementability – As with Ohio EPA Modified Alternative S2, the institutional and engineering controls on which Alternative S3 relies are commonly used strategies and have been widely applied at other sites with soil impacts.

Cost – In addition to the administrative costs for implementation of the institutional controls, this alternative would require capital investment to upgrade the ventilation system at the FTP building. As with Ohio EPA Modified Alternative S2, there would also be costs associated with setting up a floor inspection and maintenance program, including an initial floor inspection and repair. Ongoing (annual) costs would be incurred to implement the floor program which would include soil sampling activities to monitor the progress of the natural attenuation anticipated to be occurring.

4.2.4 Alternative S4 (SVE with Ex-Situ Treatment and Institutional and Engineering Controls)

Alternative S4 (SVE with Ex-Situ Treatment and Institutional and Engineering Controls) is presented below, using the seven evaluation criteria outlined at the beginning of this chapter.

Overall Protection of Human Health and the Environment – Alternative S4 includes all the controls that Ohio EPA Modified Alternative S2 includes, and therefore provides overall protection of human health and the environment. Additionally, active remediation of vadose zone soils in the vicinity of the former source area has the potential of reducing continued soil impacts to groundwater.

Compliance with ARARs – No location-specific ARARs were identified which would apply to this alternative. All potential action-specific or chemical-specific ARARs, such as those associated with permitting SVE air discharges and handling of treatment residuals (GAC), would be met.

Long-Term Effectiveness and Permanence – The SVE system can be maintained indefinitely, with proper monitoring and maintenance. However the long-term effectiveness of implementing SVE cannot be assured, mainly due to the dominant silt/clay soils encountered in the vadose zones. Institutional and engineering controls to protect human health can be maintained indefinitely and periodic site review would assure that necessary modifications can be identified and implemented.

Reduction of Toxicity, Mobility, or Volume Through Treatment – The toxicity and volume of extracted CVOCs are eliminated by the thermal regeneration of vapor-phase GAC used for ex-situ treatment. Significant reductions in CVOC mass in the subsurface, via implementation of SVE, may be limited due to the following site-specific factors:

- Vadose zone soils are quite heterogeneous, consisting of silty sands and clay/silt. The dominant vadose zone soil type is clay/silt. SVE is typically most effective on coarse-grained, permeable soils. Based on the known vadose zone soil types, the effectiveness of SVE is deemed moderate to minimal, at best.
- Previous experience with SVE applications at other sites indicates that the majority of subsurface air flow occurs along preferential pathways of more permeable layers, with minimal effectiveness on less permeable (e.g., clays and silts) soil types, even over longer time frames. It is, therefore, likely that a significant portion of CVOC residuals will remain in the subsurface even following extensive SVE system operation.

- Residual toxicity and contaminant mass would be reduced through natural attenuation, as also provided for in Ohio EPA Modified Alternative S2 and Alternative S3.

Short-Term Effectiveness – Alternative S4 uses the same institutional controls as Ohio EPA Modified Alternative S2 to protect industrial, construction, and utility workers in the short term.

Implementability – SVE and ex situ treatment are technically implementable at the Site, as the process for pilot testing, pre-design data collection, design, construction and operation is relatively straightforward. Logistically, this process is relatively complex. As with Ohio EPA Modified Alternative S2, the institutional controls on which Alternative S4 relies are commonly used strategies and have been widely applied at other sites with soil impacts.

Cost – In addition to the administrative costs for implementation of the institutional and engineering controls, this alternative would require capital investment for design and construction of the SVE system and equipment. Annual expenditures for system operation and maintenance would also be necessary. As with Ohio EPA Modified Alternative S2, there would also be costs associated with setting up a floor inspection and maintenance program, including an initial floor inspection and repair. Ongoing (annual) costs would be incurred to implement the floor program and there would likely be site review every five years, which would include soil sampling activities to monitor the progress of the natural attenuation anticipated to be occurring.

The total design life of the SVE system is estimated at 10 years. This is in large part due to the fact that the majority of mass removal with SVE occurs in the earlier portions of its operation. It is unlikely that SVE operation beyond 10 years would provide any additional mass removal, even with periodic system adjustments. Costs for the remaining portions of this alternative (i.e., institutional and engineering controls) are based on a 25-year design life, similar to other alternatives in the FS.

4.2.5 Comparative Summary of On-Site Soil Alternatives

The four remedial alternatives evaluated for on-Site soils are compared below, using the seven evaluation criteria discussed above.

Overall Protection of Human Health and the Environment – Alternative S1 does not provide overall protection of human health. Ohio EPA Modified Alternative S2 and Alternatives S3 and S4 provide overall protection of human health.

Compliance with ARARs – No chemical-specific, location-specific or action-specific ARARs were identified which would apply to these alternatives.

Long-Term Effectiveness and Permanence – Alternative S1 does not provide long-term effectiveness and permanence. Ohio EPA Modified Alternative S2 and Alternative S3 provide long-term effectiveness and permanence.

Reduction of Toxicity, Mobility or Volume Through Treatment – Alternative S1 does not provide reduction of toxicity, mobility or volume of the soil impacts. Ohio EPA Modified Alternative S2 and Alternatives S3 and S4 provide for the reduction of toxicity and volume of contaminants through natural attenuation. None of these alternatives addresses mobility.

Short-Term Effectiveness – Alternative S1 is not effective in the short-term. Ohio EPA Modified Alternative S2 and Alternatives S3 and S4 use institutional and engineering controls to protect industrial, construction and utility workers in the short term.

Implementability – Alternative S1 is not implementable from a regulatory perspective. Ohio EPA Modified Alternative S2 and Alternatives S3 and S4 are equally implementable from an administrative standpoint, but because Alternative S3 includes a capital project component (ventilation system modification) it is somewhat less implementable than Ohio EPA Modified Alternative S2.

Cost – Alternative S1 has no cost associated with implementation. Ohio EPA Modified Alternative S2 has some implementation and review costs, but no major capital costs. Alternative S3 is the most expensive because it has all the costs of Ohio EPA Modified Alternative S2 and adds the significant cost of ventilation system modification. Alternative S4 is similar in cost to Alternative S3.

Based on the analysis and comparison presented here, Ohio EPA Modified Alternative S2 (institutional controls and engineering controls with natural attenuation) is the recommended alternative for on-Site soils.

4.3 Analysis of Alternatives for Shallow Groundwater

In this section, each of the alternatives for shallow groundwater is evaluated using the seven evaluation criteria outlined above. Discussions are focused on the characteristics of each individual alternative rather than how each alternative compares with others.

4.3.1 Alternative G1 (No Action)

An evaluation of the no action alternative is presented in this section, in the context of the seven evaluation criteria outlined above.

Overall Protection of Human Health and the Environment – The no action alternative does not provide overall protection of human health, because the Site-specific risk assessment indicates that concentrations of chemicals of concern in shallow groundwater pose a threat to the health of construction or utility workers at the Site. As criteria 1 is a threshold criterion and is not met, additional evaluation of this alternative is not necessary.

4.3.2 Alternative G2 (Partial Containment with Institutional and Engineering Controls)

An evaluation of Alternative G2 is presented in this section, in the context of the seven evaluation criteria outlined above.

Overall Protection of Human Health and the Environment – Shallow groundwater impacts would persist under Alternative G2, but their duration would be shorter than for natural attenuation alone. Exposure of potential receptors would be prevented through institutional and engineering controls. In addition, containment would prevent future potential exposures. CVOC concentrations in shallow groundwater are expected to decrease upgradient of the containment system through decay and mass removal. CVOC impacts downgradient of the containment system should eventually attenuate. Institutional and engineering controls would be maintained to protect human health until it can be demonstrated through sampling and analysis that CVOCs in shallow groundwater no longer pose a threat. No threats to ecological receptors have been identified; therefore, this remedial alternative for shallow groundwater provides overall protection of the environment.

Compliance with ARARs – No location-specific ARARs were identified which would apply to this alternative. All potential action-specific or chemical-specific ARARs, such as those associated with permitting of treated water discharge and handling of treatment residuals, would be met.

Long-Term Effectiveness and Permanence – The containment system can be maintained indefinitely with proper monitoring and maintenance. There is no reason to believe that its effectiveness would diminish over time. Similarly, the institutional and engineering controls to protect human health can be maintained indefinitely and periodic Site review would assure that necessary modifications can be identified and implemented.

Reduction of Toxicity, Mobility or Volume Through Treatment – Alternative G2 reduces the toxicity and volume of impacted shallow groundwater through collection and in-situ treatment. The hydraulic containment system reduces mobility and volume of CVOCs in shallow groundwater. In addition, natural attenuation will reduce toxicity.

Short-Term Effectiveness – Alternative G2 uses institutional and engineering controls to protect construction and utility workers in the short term. The hydraulic containment system protects the off-Site community during implementation.

Implementability – This alternative utilizes proven reliable technology. All services and materials necessary to implement the containment system are readily available. The institutional and engineering controls in this alternative are commonly used strategies and have been widely applied at other sites with groundwater impacts.

Cost – Under this alternative, the existing hydraulic containment system would be extended onto the former school location. This would be the most significant portion of the overall cost of this alternative. The existing groundwater treatment system has sufficient capacity to handle the additional flows generated by the extended collection system, so it would not require modification. Some administrative costs would be associated with implementing institutional controls. Ongoing (annual) costs would include shallow groundwater sampling activities.

4.3.3 Alternative G3 (Active In-Situ Bioremediation w/Natural Attenuation & Controls)

An analysis of Alternative G3 (Active In-Situ Bioremediation) is presented below, using the seven evaluation criteria outlined above.

Overall Protection of Human Health and the Environment – Shallow groundwater impacts would persist under Alternative G3, but their duration may be shorter than under Alternative G2. Exposure of potential receptors would be prevented through institutional and engineering controls. In addition, the downgradient containment required under this alternative would largely prevent future potential exposures off-Site, but not as effectively as Alternative G2, which includes an extended containment system. CVOC concentrations in shallow groundwater would decrease upgradient of the containment system through targeted in-situ bioremediation. CVOC impacts downgradient of the containment system are expected to naturally attenuate. Institutional and engineering controls would be maintained to protect human health until it can be demonstrated through sampling and analysis that CVOCs in shallow groundwater no longer pose a threat. No threats to ecological receptors have been identified, therefore this remedial alternative provides overall protection of the environment.

Compliance with ARARs – No location-specific ARARs were identified which would apply to this alternative. All potential action-specific or chemical-specific ARARs, such as those associated with permitting of treated water discharge and handling of treatment residuals, would be met.

Long-Term Effectiveness and Permanence – Both the in-situ bioremediation system and the containment system can be maintained indefinitely with proper monitoring and maintenance. The effectiveness of the containment system would not diminish over time, but the long-term effectiveness of the in-situ bioremediation system cannot be assured, mainly because of the potential for plugging of the saturated soil by solids generated during chemical or biologically mediated reactions. Institutional and engineering controls to protect human health can be maintained indefinitely and periodic Site review would assure that necessary modifications can be identified and implemented.

Reduction of Toxicity, Mobility or Volume Through Treatment – Under Alternative G3, toxicity and volume of impacted shallow groundwater would be reduced through in-situ bioremediation and through collection. As with Alternative G2, the hydraulic containment system under Alternative G3 reduces mobility of CVOCs in shallow groundwater. In addition, natural attenuation will reduce toxicity downgradient of the containment system.

Short-Term Effectiveness – Alternative G3 relies on institutional and engineering controls to protect construction and utility workers in the short term. The hydraulic containment system would protect the off-Site community during implementation. Because the effectiveness of in-situ bioremediation is Site-specific, the short-term effectiveness of this aspect of Alternative G3 cannot be assured until pre-design testing is performed. In the short term, nearby potential receptors may not be protected. The time to reach remedial objectives is uncertain, but if bioremediation is effective, the duration may be shorter than containment without active in-situ bioremediation.

Implementability – Because the in-situ bioremediation utilized in this alternative is Site-specific, bench-, pilot- and field-scale testing would likely be required before implementation. The infrastructure required by this alternative is based on reliable technology and all services and materials necessary to implement the injection and containment systems are readily available. The institutional and engineering controls in this alternative are commonly used strategies and have been widely applied at other sites with groundwater impacts.

Cost – Alternative G3 would require completion of pre-design investigations which add to the overall cost. In addition, while the existing groundwater control system could be used for downgradient containment, an upgradient injection system would have to be constructed. This alternative will carry higher operational costs for a number of reasons. Amendments necessary to promote in-situ bioremediation will carry recurring costs, including:

- Operation of the upgradient injection system will add to the monitoring, maintenance and utility costs.
- The alternative may require modification of the existing groundwater treatment system because some of the bioremediation amendments added to the subsurface may not be fully consumed and may impact the treatment system. For example, if nutrients are added, excess nutrients may be collected and promote excessive biological growth in the carbon vessels. Because these potential treatment system modifications cannot be predicted, more rigorous treatment monitoring will be required, which will result in higher operational costs for this alternative.
- Some administrative costs would be associated with setting up a floor inspection and maintenance program, including an initial floor inspection and repair, and in implementing institutional controls. Ongoing (annual) costs would be incurred to

implement the floor program including shallow groundwater sampling. It is assumed that the operation duration of this alternative would be less than for containment alone, but there is no reliable way to estimate that duration, so it is assumed that the duration of Alternative G3 is half that of Alternative G2, or 12.5 years.

4.3.4 Comparative Summary of Shallow Groundwater Alternatives

The three remedial alternatives evaluated for shallow groundwater are compared below, using the seven evaluation criteria discussed above.

Overall Protection of Human Health and the Environment – Alternative G1 does not provide overall protection of human health and the environment. Alternatives G2 and G3 provide overall protection of human health and the environment.

Compliance with ARARs – No chemical-specific, location-specific or action-specific ARARs were identified which would apply to the no action alternative. Both Alternative G2 and Alternative G3 would comply with action- and chemical-specific ARARs.

Long-Term Effectiveness and Permanence – Alternative G1 does not provide long-term effectiveness and permanence. The long-term effectiveness and permanence of Alternative G2 is assured. Under Alternative G3, the infrastructure (upgradient injection and downgradient collection) can be operated and maintained in the long term. However, the long-term effectiveness of in-situ bioremediation cannot be assured.

Reduction of Toxicity, Mobility or Volume Through Treatment – Alternative G1 does not provide reduction of toxicity, mobility or volume of shallow groundwater impacts. Alternatives G2 and G3 both provide for the reduction of toxicity and volume of contaminants through mass removal. Similarly, both alternatives reduce mobility through hydraulic containment. Downgradient natural attenuation reduces toxicity under both Alternatives G2 and G3.

Short-Term Effectiveness – Alternative G1 is not effective in the short term. Alternatives G2 and G3 both rely on institutional and engineering controls to protect construction and utility workers in the short term. Short-term effectiveness in protecting potential nearby off-Site receptors is assured through extension of the containment system onto school property. The short-term effectiveness of in-situ bioremediation in protecting potential nearby off-Site receptors under Alternative G3 cannot be assured until pre-design testing is performed. In the short-term, these receptors may not be protected.

Implementability – Alternative G1 is not implementable from a regulatory perspective. Alternatives G2 and G3 are implementable from an administrative standpoint. Alternative G2 requires no pre-design testing and much less design effort to implement the extension of the groundwater control system. Alternative G3 cannot be fully implemented until pre-design testing is complete. Previous experience from an ISCO pilot study indicates that the saturated zone soils at the FTP plant location consist primarily of very fine sands, silts and some clay with relatively low hydraulic conductivity. In addition, injection of amendments to stimulate bioremediation will require regulatory approval and may require a permit, which is relevant to the administrative implementability of Alternative G3.

Cost – Alternative G1 has no cost associated with it. Alternative G3 has higher capital and annual operating costs (\$1,095,000 and \$3,613,000, respectively) than Alternative G2 (\$737,000 and \$2,451,000, respectively).

5.0 SELECTED REMEDIAL ALTERNATIVE

Ohio EPA has selected as its remedial alternative the simultaneous implementation of Ohio EPA Modified Alternative S2 (Institutional Controls and Engineering Controls with Natural Attenuation) for on-Site soil, and Alternative G3 (Active In-Situ Bioremediation with Natural Attenuation) for shallow groundwater (only if applicable after pre-design investigation).

The selection of Ohio EPA Modified Alternative S2 is supported by the fact that it does not require an expensive capital component (ventilation system modification) like that required in Alternative S3. The selection of Alternative G3, assuming bioremediation is pilot-tested to be feasible and appropriate at the FTP Site, is supported by the facts that G3 is expected to remediate CVOCs in the area with the highest CVOC concentration (*i.e.*, impacted area) and that it has a greater assurance of long-term effectiveness. If Alternative G3 is not implementable due to geological controls, then Alternative G2 will be implemented.

The selected remedial alternative will address the CVOCs (including TCE, TCA, DCE, DCA and vinyl chloride) generated from the source materials that constitute the principal threat.

The Village of Fayette School Board and D. H. Holdings entered into an agreement that the former Gorham-Fayette School property would be used for no other purpose than "green space." While not part of this remedial alternative, the terms of the agreement between D. H. Holdings and the School Board prohibit the construction of any buildings on the former school property and allow the property to be used only for "green" space.

Based on information currently available, Ohio EPA believes the selected remedial alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to balancing and modifying criteria. Ohio EPA expects the selected alternatives to satisfy the following requirements: 1) protection of human health and the environment; 2) compliance with ARARs; 3) cost-effectiveness; 4) utilization of permanent solutions and alternative treatment technologies (*e.g.*, innovative) to the maximum extent practicable; and 5) satisfaction of the preference for treatment as a principal element. The elements of the selected remedial alternative are as follows:

5.1 On-Site Soil Alternative

Ohio EPA's selected alternative for addressing CVOC chemicals of concern in on-Site soils includes the establishment of an environmental covenant for the former FTP property.

The environmental covenant will include the following institutional controls:

- A restriction will be applied to the former FTP property prohibiting subsurface activities within the impacted areas. Subsurface activities in the impacted areas may be performed upon issuance of an Ohio EPA-approved soil management plan (SMP) and under the supervision of individuals with an understanding of the subsurface environmental conditions and the potential threats. As necessary, a Site-specific health and safety plan will be required for subsurface activities to ensure that appropriate measures are in place to protect worker health and safety.
- A land-use restriction will be applied to the former FTP property to maintain its current industrial land use.

The environmental covenant "runs with the land," i.e., transfers with the deed and will remain in place until it can be demonstrated through an Ohio EPA-approved monitoring program that concentrations of chemicals of concern have attenuated to levels that no longer pose an unacceptable threat to human health.

Performance Standards

- Establish an Ohio EPA-approved SMP for subsurface activities on the former FTP property as necessary.
- Establish and maintain an Ohio EPA-approved inspection, maintenance and repair program for the former FTP building.
- Provide documentation that an environmental covenant has been recorded with the Fulton County Recorder's Office, restricting the former FTP property to industrial land use only and prohibiting subsurface activities in the affected areas..
- Monitor Site soil and groundwater in accordance with an Ohio EPA-approved monitoring program until the CVOC concentrations have attenuated to levels that no longer pose an unacceptable threat to human health.

5.2 Shallow Groundwater Alternative

Ohio EPA's selected alternative for addressing CVOC chemicals of concern in shallow groundwater includes active in-situ bioremediation to reduce the highest CVOC concentrations in shallow groundwater, centered roughly in the southwestern portion of the former FTP property. The target area for bioremediation activities includes the area within the 1,000 µg/l total CVOC contour, as delineated in the FS. Although this remedial alternative assumes in-situ bioremediation, final selection of the technology will depend on bench-, pilot- and field-scale testing. The goal of this action is to reduce total CVOC concentrations to less than 1,000 µg/l.

The in-situ bioremediation system will consist of an injection gallery or trench located upgradient of the target area, through which appropriate amendments would be added to the upper saturated sand layer. Natural groundwater flow, augmented by the slight gradient increase caused by the injection system, will carry these amendments through the target area. A shallow groundwater containment system located downgradient will collect treated groundwater and either re-circulate it through the treatment zone or discharge it elsewhere.

This alternative does not address all shallow groundwater impacts, but instead assumes that some shallow groundwater downgradient of the capture zone of the containment system may continue to migrate. Results of modeling indicate that concentrations of CVOCs in shallow groundwater downgradient of the containment system will eventually be reduced to their respective safe drinking water MCLs. The model also predicts that during that time, the impacts will migrate approximately 1,050 feet at which point the plume will stabilize and further migration will not occur.

As previously noted, this alternative includes institutional and engineering controls to address current exposure risks posed by shallow groundwater impacts. It is assumed that these controls are sufficient to protect the health of industrial, construction and utility workers on the FTP property until active remediation reduces CVOCs to concentrations that no longer pose an

unacceptable threat to human health. The following institutional and engineering controls are included in this alternative:

- A restriction will be applied to the former FTP property prohibiting subsurface activities within impacted areas. Subsurface activities in the impacted areas may be performed under the supervision of individuals with an understanding of the subsurface environmental conditions and the potential threats. As necessary, a Site-specific health and safety plan will be required for subsurface activities to ensure that appropriate measures are in place to protect worker health and safety.
- A land-use restriction will be applied to the former FTP property to maintain its current industrial land use.
- In regard to the engineering controls, an Ohio EPA-approved, floor inspection, maintenance and repair program will be implemented at the former FTP building to prevent infiltration of chemical vapors from groundwater and soil beneath the building.

Performance Standards

- Establish and maintain an Ohio EPA-approved soil management plan for subsurface activities on the former FTP property.
- Establish and maintain an Ohio EPA-approved inspection, maintenance and repair program for the former FTP building.
- Provide documentation that an environmental covenant has been recorded with the Fulton County Recorder's Office, restricting the former FTP property to industrial land use only.
- Provide documentation that use of the former Gorham-Fayette School property is consistent with the settlement agreement between D.H. Holdings and the Gorham-Fayette School Board stipulating use of the property will be limited to "green" space (*i.e.*, no buildings, structures, etc.).
- Conduct in-situ bioremediation operations, if applicable, including periodic groundwater sampling and analyses, until total CVOC concentrations at all previously identified impacted areas have been reduced to less than 1,000 µg/l.
- Monitoring Site soil and groundwater in accordance with an Ohio EPA-approved monitoring program until the CVOC concentrations have attenuated to levels that no longer pose an unacceptable threat to human health.

6.0 DOCUMENTATION OF SIGNIFICANT CHANGES

None

7.0 RESPONSIVENESS SUMMARY

1. Comment from David Green, Stateline Observer (Local Newspaper)

In the past, the Ohio EPA always acknowledged the slow movement of the plume of contaminated ground water across the former school property. Will this plume continue to be monitored? Will new monitoring wells be installed to track the progress of the plume?

The Ohio EPA will continue to monitor the contaminant plume and if need be, will order the installation of additional monitoring wells.

2. Comments from the Village of Fayette

- a. The Preferred Plan states that vinyl chloride contamination "was" present in the former Village well field aquifer (Page 12, Section 3.2.5; Page 25, Section 3.3.3). The source of vinyl chloride contamination within the former Village aquifer has to date not been identified and, based on the most recent data collected from the Village well field aquifer, the contamination is still present. Remediation of the former Village aquifer is not proposed within the Preferred Plan, even though vinyl chloride remains within the aquifer.

How will the former Village well field aquifer be monitored to evaluate trends in the vinyl chloride concentrations?

How will the former Village well field aquifer be monitored to determine if contamination within shallow groundwater resulting from operations at the FTP Site reaches the former Village well field aquifer?

Ohio EPA has had the benefit of reviewing the Remedial Investigation (RI) Report and groundwater data from over ten years of continuous monitoring of the Village aquifer. Monitoring associated with the former well field is not necessary. Based on decommissioning of the former village wells, there are no risks to receptors and a remedy is in place. The former Village wells were decommissioned years ago and new and deeper wells north of the FTP Site are now in use. In addition, the well field is upgradient of the contamination source.

- b. What is the anticipated timeframe for natural attenuation of soils on the FTP Site? Will institutional and engineering controls remain in effect until acceptable levels are achieved? An understanding of this timeframe is important for future land use considerations.

Ohio EPA thoroughly examined the time frame for natural attenuation of soils on the FTP site in the Remedial Investigation (RI) and Feasibility Study (FS) reports. In the FS, Section 4.3.2 states that "Over time, the VOCs in soil will degrade, as evidence by the degradation of primary compounds already observed. However, this process of natural attenuation may take decades, therefore, institutional controls will be maintained until it can be demonstrated through sampling and analysis that they are no longer necessary to protect human health. Until that time, the institutional controls identified in this alternative will provide overall protection of human health. No threats to ecological receptors have been identified, therefore, this remedial alternative, like all other alternatives for soil, provides overall protection of the environment".

Please refer to the RI and FS reports for more details. The FTP property is zoned industrial and, in accordance with the environmental covenant, will remain so.

- c. The Village previously provided the Ohio EPA with information indicating possible impacts to the Village sewer system resulting from operations at the FTP Site. Included in this information are analytical data for samples collected from several catch basins in close proximity to the FTP Site. One of these samples collected from the catch basin at the southwest corner of Railroad and Gamber Streets exhibited significant contamination of the same chemicals of concern as found on the FTP Site. Village utility crews recently completed a repair of a sewer line at the southwest corner of Railroad and Gamber Streets. During the repair, shallow groundwater entering the excavation exhibited a strong, organic odor, and visual observations of contamination were observed. In addition to the above, historical information associated with the FTP Site documents cleaning of the on-Site sewer system and removal of material that was contaminated by operations at the FTP Site.

Considering the documented contamination within the FTP sewer system, contamination encountered in shallow groundwater during the recent sewer repair, and the contamination in the sample collected from the catch basin at the southwest corner of Railroad and Gamber Streets, what is the approach under the Preferred Plan to address contamination adjacent to/within the Village sewer system?

What measures are proposed under the Preferred Plan to ensure the health, safety and welfare of Village workers completing sewer repairs in the vicinity of the FTP Site?

The Ohio EPA Division of Surface Water, Office of Special Investigations and the Division of Emergency and Remedial Response met several times with the Village and on two occasions with Thomas Covrett of the Mannik & Smith Group (representing the Village) to discuss these issues. In a letter dated September 15, 2005, to Mr. Nunn (representing the Village) and copied to Village officials, Ohio EPA provided historical and technical accounts of the Village sewer system and the FTP remedial project. Please refer to the letter and to the RI report. An excerpt from the letter states "You may not be aware, but the Village has a Combined Sewer System (sewage and storm water) which generally implies that the system is flushed out after heavy rain and/or snow melt." Eventually, the sewage and the storm water from the Fayette community empties into the two treatment lagoons north of the FTP building. It is well documented that FTP stopped using TCE as a degreaser in 1982. The Village administration in 1994, proposed to dredge the lagoons and land apply the sludge. As a condition for the approval, our Division of Surface Water (DSW) required that the Village sample and analyze the sediments from the lagoons. The top and the bottom of each lagoon were sampled and analyzed for volatile organic compounds (VOC) and metals. The TCE detections in the samples were relatively low for a Combined Sewer system. The village administrator at the time, John Daly, in a letter dated April 13, 1995 noted that "I do not see any thing that impacts adversely on the sludge removal project." Subsequently, the lagoons were dewatered, the sludge removed and land applied on area farms by the village under Ohio EPA supervision.

We have also reviewed the yearly reports in our DSW files from 1982 to 1997. There are no detections of TCE in the effluent from FTP and no violations of its permit. It was, therefore, concluded that the detections in the Village sewer and catch basin at the southwest corner of Railroad and Gamber Streets should be attributed to a different source. Ohio EPA will discuss possible options with the village.

The Preferred Plan is neither a Health and Safety document nor a risk assessment report. Information regarding Site safety and workers' safety is available in the RI report (Human Risk Assessment section) and in the Health and Safety Plan developed by LTI and PSC on behalf of D.H. Holdings. The Remedial Action Objective in FS 1.8 is to "reduce human health risks resulting from potential exposure of industrial and construction/utility workers to chemical impacts in on-Site soils. Risks should be reduced to the acceptable excess risk of 10^{-6} to 10^{-4} , or lower, for carcinogens and to a non-carcinogen hazard index of less than one."

- d. The source of the shallow groundwater contamination to the west of the FTP Site has to date not been identified, and remediation is not included within the Preferred Plan. On Page 14 of the Preferred Plan, it states, "The RI revealed groundwater impacts west of the facility that are not attributable to the FTP Site. Although the source of these impacts is unknown, it is believed that they are not related to the FTP Site because they are located cross-gradient from the Site and are part of a discontinuous pattern of impacts." As noted above, available information suggests a potential for impact to the Village sewer system resulting from operations at the FTP Site; this information may be useful in determining the source of contamination to the west of the FTP Site.

What investigative activities have been completed under the RI/FS to determine the source of contamination in shallow groundwater to the west of the FTP Site?

How has the on-site FTP sewer system and Village sewer system been evaluated under the RI/FS to determine their relationship (if any) to the contamination to the west of the FTP Site?

Very extensive soil and groundwater sampling was conducted west of the FTP Site during the RI. There is no technical or historical basis to conclude that the operation at the FTP Site impacted the Village sewer system. Please refer to response to comment 1c above, and to the RI report. Ohio EPA file information and the RI report document extensive soil and groundwater investigations along the sewer lines to the west, south and east of the FTP property. The resulting contaminant plume geometry developed from those investigations clearly shows a separation between the contaminant plumes. Most of the detections west of the FTP Site are at relatively low levels. These levels are below the goal of the remedial action which is to reduce total CVOC concentrations to less than 1,000 µg/l.

Interviews with area residents, west of the FTP property, indicate that spent TCE was commonly used for weed and dust control.

- e. Related to #d above, historical data indicates that TCE is present in shallow groundwater to the west of the FTP Site above the USEPA Maximum Contaminant Level (MCL, or drinking water standard) of 5 µg/l. MCLs are typically used as the target cleanup levels by the Ohio EPA in the remediation of groundwater contamination. In fact, cleanup to MCLs is cited as the acceptable level within the Preferred Plan for Alternative G2 (Page 24) and Alternative G3 (Page 26).

Why is contamination above the MCL to the west of the FTP Site being omitted from the Preferred Plan, even though the contamination exhibits the same chemicals of concern as the FTP Site?

How can MCLs be used for cleanup of shallow groundwater on the FTP Site, but not be applied to contamination to the west of the FTP Site or vinyl chloride contamination in the former Village well field aquifer?

How will shallow groundwater contamination to the west of the FTP Site be monitored to ensure the health, safety and welfare of Village residents?

What types of restrictions (if any) will be implemented under the Preferred Plan to protect Village residents in the area to the west of the FTP Site where shallow groundwater contamination exists?

The Preferred Plan states that the goal of the remedial action is to reduce total CVOC concentrations at the Site to less than 1,000 µg/l. The contamination west of the FTP Site is not omitted in the Preferred Plan. The FS Section 2.1.2 states that "shallow groundwater impacted by CVOCs is present both on-Site and off-Site. This impacted shallow groundwater poses a health risk to construction and utility workers. In addition, although shallow groundwater impacts do not currently pose a human health risk for workers on the FTP Site or off-Site residents and school occupants, the future potential for these exposure pathways must be considered and potential receptors must be protected." And in the FS, section 3.1, the remedial action objectives clearly include actions for the Village aquifer, shallow ground water on and off Site.

A local ordinance prohibiting the use of shallow groundwater is expected to provide protection against human exposure to the shallow aquifer groundwater.

- f. In several locations within the Preferred Plan, the Ohio EPA includes the phrase, "it is assumed" in their evaluation of remedial alternatives. For example, on Page 19 (Ohio EPA Modified Alternative S2) it states, "It is assumed that these controls are sufficient to protect the health of industrial, construction and utility workers on the FTP property." A similar statement is provided on Page 24 (Alternative G3) of the Preferred Plan. These statements indicate uncertainty by the Ohio EPA in the effectiveness of the remedial alternatives being evaluated; however, both of these alternatives are selected by the Ohio EPA as preferred remedial alternatives.

How confident is the Ohio EPA that the selected remedial alternatives will be effective at reducing contamination to acceptable levels?

Ohio EPA is confident that the selected remedial alternatives will be effective at reducing contamination to acceptable levels because the remedial alternatives will utilize proven technologies and methodologies with good results in similar geologic settings.

The use of the phrase "it is assumed" is standard language in both USEPA and Ohio EPA Preferred Plans and Decision Documents. In preparing Feasibility Studies, the remedial alternatives are analyzed using data/information derived from assumptions made in the risk assessments and modeling reports in the Remedial Investigation. These assumptions subsequently form the basis for the Preferred Plan and the Decision Document. Therefore, the use of the phrase does not indicate lack of confidence in the selected remedial alternatives, but rather implies that no Site-specific pilot testing has yet been undertaken and that basic assumptions were made in the selection process.

- g. Within the Preferred Plan, the former school location will be designated as permanent "green space," or until natural attenuation occurs and concentrations are determined to

be at acceptable levels. Under Alternative G2 (Page 24), the Ohio EPA states that modeling has identified a timeframe of 300 years for natural attenuation to reduce contamination to acceptable levels. The evaluation of shallow groundwater Alternative G3 (selected by the Ohio EPA as a preferred remedy) does not identify the anticipated timeframe for remediation of contamination to acceptable levels.

What is the anticipated timeframe for remediation of contamination to acceptable levels under remedial Alternative G3? An understanding of this timeframe is important for future land-use considerations.

The Groundwater Alternative G3 does not include an anticipated timeframe for remediation due, in part, to uncertainty surrounding the selection of an actual treatment technology (i.e., in-situ bioremediation). The introduction of active treatment technology will augment the natural attenuation of the contaminants which in turn should decrease the anticipated timeframe of 300 years. The degree to which the previously modeled natural attenuation timeframe (i.e., 300 years) can be reduced will depend on selection of the specific in-situ technology. The in-situ technology will be based upon bench, pilot and field-scale testing as part of the Remedial Design phase. It is important to note that if in-situ bioremediation does not successfully reduce the concentrations of contaminants, Ohio EPA will direct D. H. Holdings to implement remediation in conjunction with Alternative G2, which utilizes containment technologies as opposed to treatment.

- h. The Preferred Plan includes an evaluation of Alternative G2 consisting of a trench-and-media hydraulic control system. On Page 23, the Preferred Plan states that "A geotechnical barrier would have to be keyed into the clay-silt layer underlying the upper saturated sand layer, which would present the risk of breaching the clay-silt layer." Historical data collected during the RI/FS indicates that the top of the lower clay-silt confining layer influences the extent of shallow contamination resulting from operations on the FTP Site. Due to the density of some of the chemicals of concern (i.e., heavier than water), the trench-and-media system may need to be keyed into the lower clay-silt layer to ensure contamination does not pass beneath the system.

Since a trench-and-media control system will be used under Alternatives G2 and G3, will the system be keyed into the lower clay-silt confining layer? If not, how will the Ohio EPA ensure that groundwater contamination will not pass beneath the control system?

What is the contingency plan for operation of the shallow groundwater remediation system under Alternative G2 or G3 in the event of an emergency where electricity is not available to operate the pumps? If such an event were to occur, contaminated groundwater within and adjacent to the trench-and-media system could migrate and impact areas not currently impacted, or could re-impact areas that have been remediated. Combining a geotechnical barrier with the trench-and-media system would provide an additional measure to minimize the potential for migration of contaminated groundwater away from the trench-and-media system should a loss of electricity occur. Has the Ohio EPA completed an evaluation of combining both the trench-and-media system with a geotechnical barrier (i.e., slurry wall)?

The evaluation of combining the trench-and-media system with a geotechnical barrier was not completed under the FS.

A dense non-aqueous phase liquid investigation was conducted in the Source Area which is documented in the RI report (refer to the RI report for more details). The system will be keyed into the lower clay silt confining layer using a Geo-Probe® for mapping that confining layer.

The Contingency Plan for the operation of the shallow groundwater remediation system in case of emergency where electricity is not available to operate the pumps is well documented. The system is continuously monitored for any malfunction, including power failure. A battery-powered alarm system will send alarm messages to the office and mobile numbers of the Project Manager. There are also two power generators at the FTP Site that can be used in case of extended power outage.

- i. On Page 38 under Performance Standards, it states that "The performance standard is met upon submission of an environmental covenant recorded with the Fulton County Recorder's Office restricting the **Ford** property to industrial usage only and prohibiting subsurface activities" (emphasis added). Considering the Preferred Plan is for the former FTP Site, the reference to another facility appears to be a typographical error.

This is obviously a typographical error which has since been corrected.

- j. Information provided in the Preferred Plan indicates that groundwater monitoring will be a component of the selected Alternative G3 for shallow groundwater contamination. Contamination within shallow groundwater on the former school property has already been identified at both of the current most downgradient monitoring wells (MWS-8 and MWS-9) that are included in the ongoing monitoring program.

As the Preferred Plan indicates additional plume migration will occur during the natural attenuation process, how will the existing monitoring network be modified to allow for continual monitoring of the movement of the plume over time?

As noted above, this is a slow-moving plume and the monitoring network will be modified to reflect changing conditions under the "Additional Work" provisions of the Order.

3. **Comments from Fayette Chamber of Commerce**

- a. Was the Judicial Consent Order limited to the property owned by Fayette Tubular Products? (That would be parcels 19-039316-00.000 and 19-039360-00.000 totaling 12.46 acres.)

No, the Judicial Consent Order is not limited to the property formerly owned by Fayette Tubular Products. Under the Consent Agreement, the term "site" is defined as "the physical facility located at Railroad and Gamber Streets in the Village of Fayette, Fulton County, Ohio where treatment, storage, placement, or disposal of hazardous waste or industrial waste or other waste have occurred, and/or where the discharge into waters of the State of industrial waste or other waste have occurred including any other area where such hazardous wastes, industrial wastes and/or other wastes have migrated or threaten to migrate."

- b. Does the *Deed Restrictions* referred to in the "Agreement" of March of 2007 between the Board of Education, D.H. Holdings and Hutchison FTS, Inc., cover only the properties owned by the Gorham-Fayette Board of Education (Parcels: 19-039628-00.000 and 19-

039665-00.000) totaling 4.74 acres? [Note: Hutchinson FTS, Inc. was not a party to that Agreement.]

Ohio EPA is not a party to this Agreement.

- c. Is there currently, or do you anticipate that institutional controls will impact land usage in any of the seven (7) parcels that currently are owned by the Village of Fayette for use as its Village Park and Water Treatment Facility? (Parcels: 19-039629-00.000, 19-039631-00.000, 19-039634-00.000, 19-039145-00.000, 19-069635-00.000, 19-039632-00.000 and 19-039152-01.000 totaling 26.36 acres.) If yes, who will promulgate? Who will be charged with enforcement?

Ohio EPA does not anticipate that institutional controls will impact land usage in areas outside of the "Site" as described in the response to Comment 3a.

- d. Do you anticipate institutional controls for properties outside the Village limits and downgradient from the path of the migrating contamination? If yes, who will promulgate? Who will be charged with enforcement?

Ohio EPA does not anticipate institutional controls for such properties because those areas are not likely to be impacted by the Site contamination and are outside of the "site".

- e. What role, if any, will local elected officials play in the promulgation of the institutional controls?

The Ohio EPA staff attorney and the Village attorney have discussed the "environmental covenant." The role of the local elected officials would be to help develop and approve the local ordinance in support of the environmental covenant.

- f. In the event that contaminants continue to migrate, will the institutional controls follow the same pathway as the contaminants?

Please see the definition of a "site" in response to Comment 3a above. A deed restriction prohibiting subsurface activities within impacted areas will be put in place.

- g. With respect to the property and facilities owned by Fayette Industrial Properties, LTD, will institutional controls on this Site impact either the usage of the grounds or facilities for multiple usages including food processing? If yes, who determines the restricted uses?

The facility owned by Fayette Industrial Properties, LTD is part of the Site as defined in the Order and as such will be subject to institutional controls. However, the institutional controls are expected to require that the former FTP Site be limited to industrial use.

- h. Is there a timeline for both travel and attenuation that will be used for the creation of the institutional controls?

No. A timeline for migration and attenuation is not necessary in order to develop an institutional control.

- i. How has the economic impact to the Village and its residents been factored into the Preferred Plan?

A Preferred Plan is not designed as an economic analysis of the community. Ohio EPA's Preferred Plan is derived from the feasibility studies for each Site and is designed to "summarize information on the range of remedial alternatives evaluated, identifies Ohio EPA's preferred remedial alternative, explains the reasons for selection of the preferred remedial alternative; solicits public review and comments and provides information on how the public can be involved in the remedy selection process."

4. Comments from Fayette Council

- a. Request that the Environmental Covenant not be used for area-wide restrictions on ground water use.

Ohio EPA working with the Village will make efforts to apply institutional controls to the impacted areas only.

- b. How would the chemicals affect individuals consuming fruits and vegetables from contaminated areas?

The nature of the contaminants of concern are such that fruits and vegetables from the area will not be affected because the CVOCs do not bioaccumulate within fruits and vegetables.

5. Comments from D.H. Holdings

"Known Site conditions severely limit the ability to pilot test or monitor the effectiveness of Alternative G3, and hence Alternative G2 from the approved Feasibility Study Report merits further consideration for the Site's Preferred Plan."

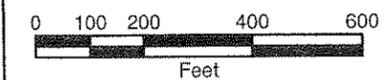
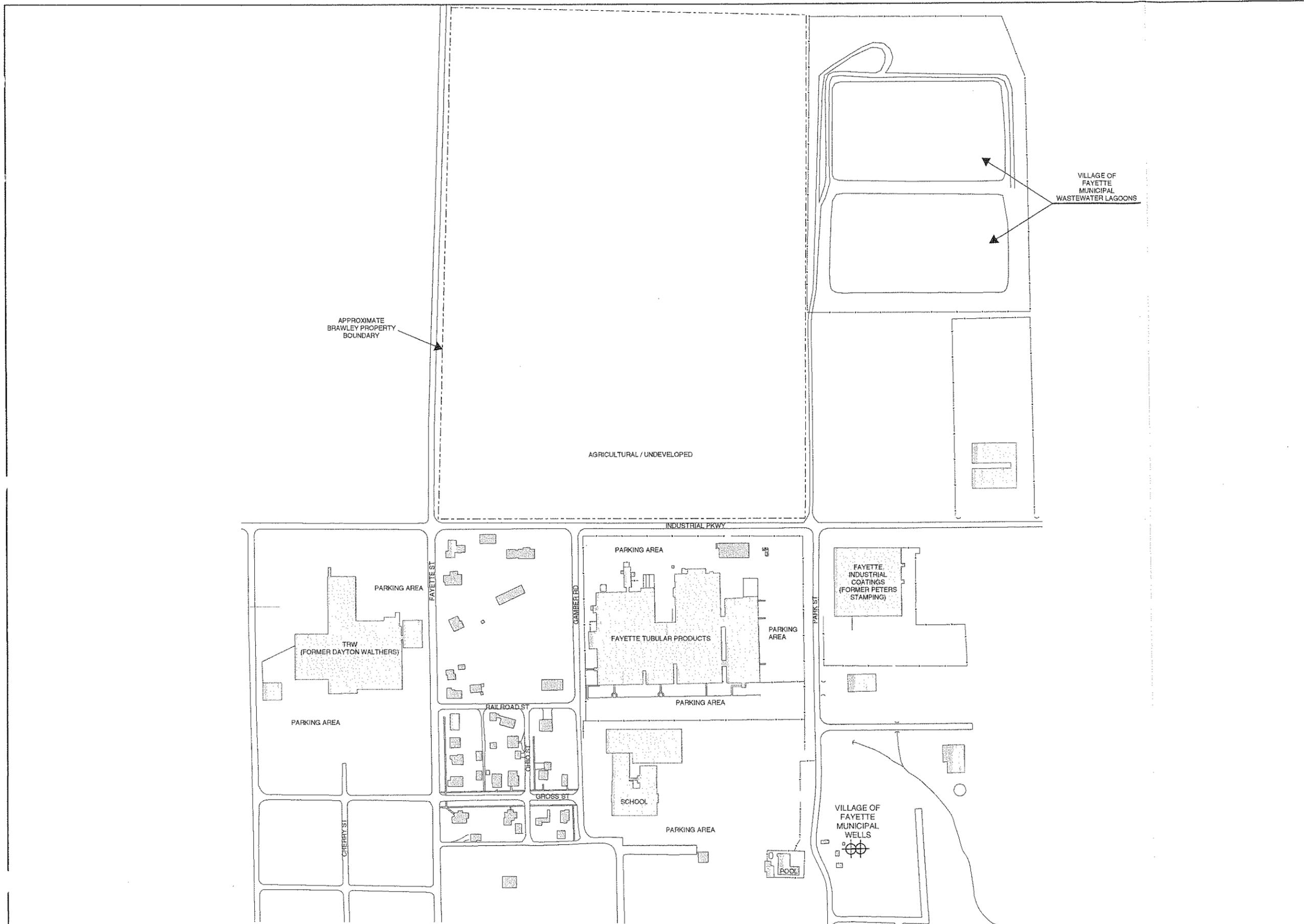
As noted in the Preferred Plan, if Alternative G3 is not implementable due to geological controls, then Alternative G2 will be implemented.

8.0 GLOSSARY

Aquifer	An underground geological formation capable of holding and yielding water.
ARARs	Applicable or relevant and appropriate requirements. Those statutes and rules which strictly apply to remedial activities at the site, or those statutes and rules whose requirements would help achieve the remedial goals for the site.
Baseline Risk Assessment	An evaluation of the risks to humans and the environment posed by a site.
Carcinogen	A chemical that causes cancer.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq. A federal law that regulates cleanup of hazardous substances sites under the U.S. EPA Superfund Program.
Contaminants of Concern (COCs)	Chemicals identified at the site which are present in concentrations that may be harmful to human health or the environment.
Decision Document	A statement issued by the Ohio EPA giving the Director's selected remedy for a site and the reasons for its selection.
Ecological Receptor	Animals or plant life exposed or potentially exposed to chemicals released from a site.
EE/CA	Engineering Evaluation/Cost Assessment. A report issued under the U.S. EPA's Superfund Accelerated Cleanup Model that evaluates remedies for a site and estimates their costs. EE/CA's are generally shorter and include fewer alternatives than Feasibility Studies.
Environmental Covenant	A servitude arising under an environmental response project that imposes activity and use limitations on real property and meets the requirements established in section 5301.82 of the Revised Code.
Exposure Pathway	Route by which a chemical is transported from the site to a human or ecological receptor.

Feasibility Study	A study conducted to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected.
Final Cleanup Levels	Final cleanup levels are identified in the Decision Document along with the RAOs and performance standards.
Hazardous Substance	A chemical that may cause harm to humans or the environment.
Hazardous Waste	A waste product, listed or defined by the RCRA, which may cause harm to humans or the environment.
Human Receptor	A person or population exposed to chemicals released from a site.
Leachate	Water contaminated by contact with wastes.
LOE Contractor	Level of Effort Contractor. A person or organization retained by the Ohio EPA to assist in the investigation, evaluation or remediation of a site.
Maximum Contaminant Level (MCL)	The highest level of a contaminant that is allowed in a public drinking water supply. The level is established by U.S. EPA and incorporated into OAC 3745-81-11 and 3745-81-12.
NCP	National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended. A framework for remediation of hazardous substance sites under CERCLA.
O&M	Operation and Maintenance. Long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.
Performance Standard	Measures by which Ohio EPA can determine if RAOs have been met.
Preferred Plan	The plan that evaluates the remedial alternatives identified in the Feasibility Study and explains the preferred remedial alternative chosen by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.

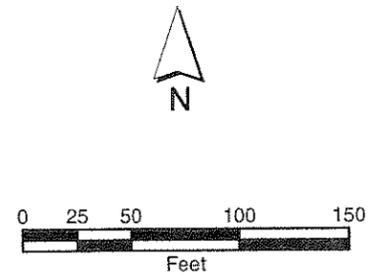
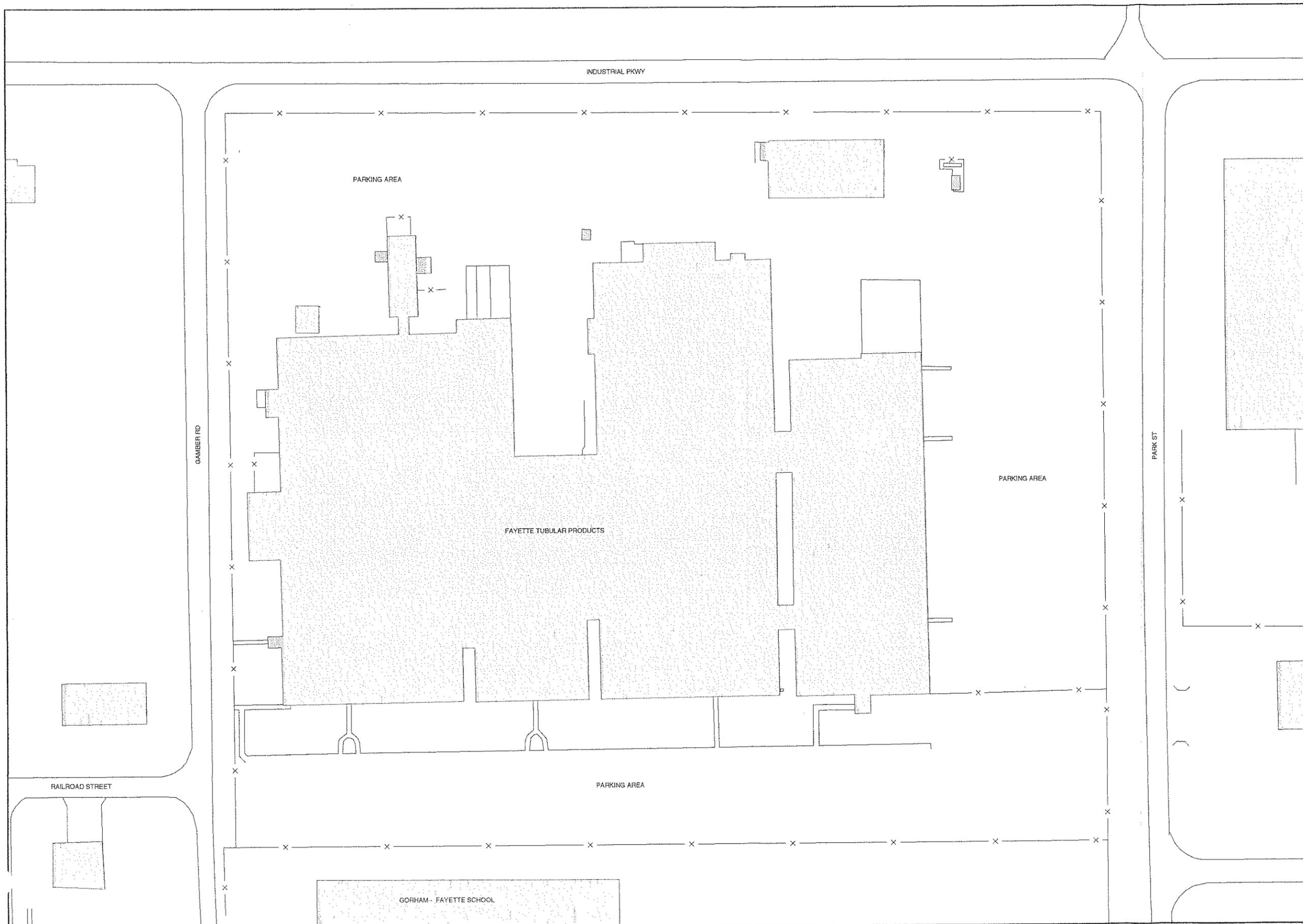
Preliminary Remediation Goal (PRG)	Initial clean-up goals that (1) are protective of human health and the environment and (2) comply with ARARs. They are developed early in the process (scoping) based on readily available information and are modified to reflect the results of the baseline risk assessment (termed site-specific PRGs at this point in time). They are also used during the analysis of remedial alternatives in the remedial investigation/feasibility study (RI/RS).
RCRA	Resource Conservation and Recovery Act of 1976 codified at 42 U.S.C. 6901 et seq., as amended. RCRA is a federal law that regulates the handling of hazardous waste.
Remedial Action Objectives (RAOs)	Specific goals of the remedy for reducing risks posed by the site.
Remedial Investigation	A study conducted to collect information necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives.
Responsiveness Summary	A summary of all comments received concerning the Preferred Plan and Ohio EPA's response to each of those comments.
Water Quality Criteria	Chemical, physical and biological standards that define whether a body of surface water is unacceptably contaminated. These standards are intended to ensure that a body of water is safe for fishing, swimming and as a drinking water source. These standards can be found in Chapter 3745-1 of the Ohio Administrative Code.
PAHs	Polycyclic aromatic hydrocarbons. Class of semi-volatile chemicals including multiple six-carbon rings. Often found as residue from coal-based chemical processes.
PCBs	Polychlorinated biphenyls. An oily chemical typically used in electrical equipment.
PCE	Tetrachloroethene or Perchloroethylene. A common industrial solvent and cleaner, often used for dry cleaning.
TCE	Trichloroethylene. A common industrial solvent and cleaner.



Fayette Tubular Products (FTP)
Fayette, Ohio

DRAFT

**FIGURE 1-1
SURROUNDING
VICINITY**



Fayette Tubular Products (FTP)
Fayette, Ohio

DRAFT

**FIGURE 1-2
SITE MAP**



N

0 100 200
Feet

LEGEND

- ▲ Geoprobe / Hand Auger
- Soil Boring (HSA)

Sample Location (# Samples collected)

- ▨ Estimated extent of soil impacts to be addressed in Feasibility Study

Fayette Tubular Products (FTP)
Fayette, Ohio

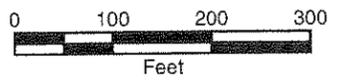
DRAFT

**FIGURE 2
EXTENT OF SOIL
IMPACTS WITH
SOIL SAMPLING
LOCATIONS**



Note:
These shallow groundwater impacts
are not attributed to the FTP site.

SBS-14: Total VOCs at this location are
driven by MEK, which is not believed to be
related to the former FTP site.



- LEGEND**
- ⊕ GW Sampling Location (6/02 - Current)
 - ◆ GW Sampling Location (Pre 6/02)
 - Non-Detect
 - Estimated concentration contours
of VOCs in shallow groundwater

Fayette Tubular Products (FTP)
Fayette, Ohio

DRAFT

**FIGURE 3
EXTENT OF
TOTAL VOCs IN SHALLOW
GROUNDWATER
2002 - 2003 (ug/L)**

LTI Environmental Engineering
A Division of Limno-Tech, Inc.
501 Avis Drive, Ann Arbor, MI 48108