Second
Five-year Review Report

Valley Park TCE Site
Valley Park
St. Louis County, Missouri

September 2008

Prepared by:

Region 7
United States Environmental Protection Agency
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And

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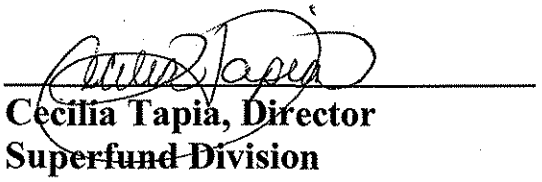

Cecilia Tapia, Director
Superfund Division
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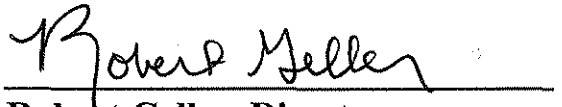
9/19/08



Robert Geller, Director
Hazardous Waste Program
Missouri Department of Natural Resources

Sept 12, 2008

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LIST OF ABBREVIATIONS

AOC	Administrative Order on Consent
Agencies	Missouri Department of Natural Resources & Environmental Protection Agency combined
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
cfm	Cubic Feet per Minute
Department	Missouri Department of Natural Resources
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
FYR	Five-year Review
gpm	Gallons per Minute
GETS	Groundwater Extraction and Treatment System
IC	Institutional Control
MCLs	Maximum Contaminant Levels
mg/m^3	Milligram per Meter Cubed
MTBE	Methyl Tertiary Butyl Ether
NCP	National Contingency Plan
NPL	National Priorities List
OU1	Operable Unit 1 – Wainwright Groundwater Remediation
OU2	Operable Unit 2 – Area-wide Groundwater
OU3	Operable Unit 3 – Wainwright Soil Remediation
O&F	Operational and Functional
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCE	Tetrachloroethylene
ppb	Parts per Billion
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SVE	Soil Vapor Extraction
TBC(s)	To Be Considered(s)
TCA	Trichloroethane
TCE	Trichloroethylene
µg/L	Micrograms per Liter
VOC(s)	Volatile Organic Compound(s)
Wainwright	Wainwright Industries, Inc.
WOU	Wainwright Operable Unit – Combined OU1 and OU3
WPCP	Water Pollution Control Program

EXECUTIVE SUMMARY

Management and implementation of the cleanup activities for the Valley Park TCE site (Site) located in Valley Park, Missouri, were divided between three operable units (OUs): (1) OU1 – remediation of soils on the property formerly owned by Wainwright Industries, Inc.; (2) OU2 – designated as Valley Park Proper for remediation of a soil source on property owned by Valley Technologies, Inc., and the area-wide groundwater plume; and (3) OU3 – remediation of groundwater on the property formerly owned by Wainwright Industries, Inc. Due to the common location, OU1 and OU3 are often referred to in combination as the Wainwright Operable Unit (WOU) which will be the referenced abbreviation in this five-year review. Basically, the Site is an area-wide groundwater plume contaminated by two source areas.

The remedies implemented for WOU and OU2 involved the same types of activities: (1) soil excavation of contaminated shallow soils, (2) soil vapor extraction of deeper contaminated soils, (3) groundwater extraction and treatment using air stripping technology, (4) institutional controls to prohibit groundwater extraction and/or use on the source area properties, and (5) groundwater monitoring networks to track the effectiveness of the remedies. Construction completion was achieved for the Site with the signing of the Preliminary Close Out Report on September 19, 2006. Pursuant to a Consent Decree with the Missouri Department of Natural Resources (Department), Wainwright Industries, Inc., operates and maintains the remedial systems at WOU. OU2 is an EPA-funded remedial action.

The remedy currently protects human health and the environment because documented threats at the Site have been addressed through excavation of shallow soils, placement of asphalt covers, institutional controls on the two source areas, and a clean water source used for the municipal water supply. However, in order for the remedy to be protective in the long term, the following actions must be taken: (1) complete an investigation to determine if site-wide vapor intrusion exists on properties adjacent to WOU and OU2 sources and the Reichhold buildings, (2) review historical data at both WOU and OU2 to determine if polycyclic aromatic hydrocarbon (PAH) and metals contamination in soils and groundwater has been adequately addressed, (3) assess the performance of the soil vapor extraction system and groundwater extraction treatment system at WOU to determine if modifications to the current systems are required to achieve Remedial Action Objectives, and (4) evaluate the soil vapor extraction system for OU2 to include alternative treatment methods to achieve soil standards.

Long-term protectiveness of the remedial actions will be verified by obtaining operation and maintenance data required by the Consent Decree for WOU and required by EPA contracts for OU2. Current data indicate that progress toward achieving cleanup goals has been achieved but at a slower rate which jeopardizes the ten-year cleanup goals. Specific issues and recommendations have been identified to address the slow cleanup rate for both source areas.

Five-year Review Summary Form

SITE IDENTIFICATION		
Site name *(from CERCLIS)*: **Valley Park TCE**		
EPA ID *(from CERCLIS)*: **MOD980968341**		
Region: 7	**State: MO**	**City/County: Valley Park / St. Louis**

SITE STATUS	
NPL status: Final	
Remediation status: Operable Units 1 and 3 are in operation and maintenance, and Operable Unit 2 is in Long-Term Remedial Action.	
Multiple OUs? YES	**Construction completion date: September 19, 2006**
Has site been put into reuse? YES	

REVIEW STATUS	
Lead agency: State: OU1 & OU3; Federal: OU2	
Author name: Steve Auchterlonie (EPA) and Wane Roberts (MDNR)	
Author title: Project Managers	**Author affiliation: US EPA Region 7; Missouri Department of Natural Resources**
Review period: April 2008 through July 2008	
Date(s) of site inspection: OU1 and OU3 was April 24, 2008; OU2 was January 9, 2008	
Type of review: Policy	
Review number: 2	
Triggering action date: Previous Five-Year Review Completion Date, Sept. 26, 2003	
Due date *(five years after triggering action date)*: **Sept. 26, 2008**	

* **["OU" refers to operable unit.]**

** **[Review period should correspond to the actual start and end dates of the Five-year review in WasteLAN.]**

Five-year Review Summary Form, continued

Issues:

WOU – Potential loss of hydraulic control due to reduced pumping rate in extraction well.

WOU – Asymptotic mass removal rates in the soil vapor extraction system and consistently high concentration levels in the groundwater extraction well at levels well above cleanup standards indicate the potential that a soil source has not been addressed and/or the effectiveness of the soil vapor extraction system requires improvement.

WOU – Cleanup activities for polycyclic aromatic hydrocarbon contamination may not have been adequately documented.

WOU – A deed restriction was implemented as a requirement of the Record of Decision when a restrictive covenant using state law is now more appropriate.

OU2 – Subsurface soil contamination levels exceed cleanup standards, and the soil vapor extraction system is not functioning.

OU2 – High contamination levels in groundwater monitoring well 56 (MW56) indicate the potential that a soil source area has not been addressed.

OU2 – Data developed since the Record of Decision indicate that an institutional control prohibiting installation and use of groundwater wells in the area-wide plume is unnecessary. In addition, follow-up is required to verify that the restrictive covenant for the Valley Technologies' property is filed with the county.

OU2 – There is an inconsistency in the value for the soil cleanup standard for 1,1,1-trichloroethane when comparing the values defined in the Record of Decision to the EPA Region 6 risk-based guidance.

Site – Vapor Intrusion is a possible exposure pathway which requires investigation using current methodology.

Site – Metals contamination may not have been adequately addressed.

Site – Plume maps are needed to determine adequacy of monitoring well network.

Recommendations and Follow-up Actions:

WOU – Restore pumping rate in extraction well. Potential solutions include but are not limited to well redevelopment using chemical and/or physical cleaning of the screen or installation of a new well.

WOU – Perform an assessment of the soil vapor extraction system through additional performance monitoring and possible remaining soil source contamination. If necessary, evaluate alternative treatment options.

WOU – A review of historic data at WOU is required to determine if polycyclic aromatic hydrocarbon contamination in soils and groundwater is adequately addressed.

WOU – EPA and the Department will work to implement a restrictive covenant using state law as required.

OU2 – Investigate alternative treatment methods to achieve soil performance standards.

OU2 – Investigate source of high levels of contamination in MW56 if the levels do not significantly decrease in 2008.

OU2 – Remove the requirement for the area-wide institutional control. If necessary, document the change in an Explanation of Significant Difference document.

OU2 – Determine if EPA Region 6 soil standards should replace standards defined in the Record of Decision. If necessary, document the change in an Explanation of Significant Difference document.

Site – An investigation is required to determine if vapor intrusion is occurring in properties adjacent to WOU and OU2 properties and in the Reichhold Chemical buildings.

Site – A review of historic data at both WOU and OU2 is required to determine if metals contamination in soils and groundwater is adequately addressed.

Site – Groundwater plume maps are required as part of the operation & maintenance reporting for both WOU and OU2.

Protectiveness Statement(s):

The remedy currently protects human health and the environment because all documented threats at the Site have been addressed through excavation of shallow soils, placement of asphalt covers, institutional controls on the two source areas, and a clean water source used for the municipal water supply. However, in order for the remedy to be protective in the long term, the following actions must be taken: (1) complete an investigation to determine if site-wide vapor intrusion exists on properties adjacent to WOU and OU2 sources and the Reichhold buildings, (2) review historical data at both WOU and OU2 to determine if PAH and metals contamination in soils and groundwater has been adequately addressed, (3) assess the performance of the soil vapor extraction system and the groundwater extraction treatment system at WOU to determine if modifications to the current systems are required to achieve Remedial Action Objectives, and (4) evaluate the soil vapor extraction system for OU2 to include alternative treatment methods to achieve soil standards.

Long-term protectiveness of the remedial action will be verified by obtaining operation and maintenance data required by the state's Consent Decree for WOU and by EPA and the Department for OU2. Current data indicate that contamination levels in the two source areas are decreasing but at low rates which jeopardize achieving the ten-year cleanup goals.

Second Five-year Review Report
Valley Park TCE Site
Valley Park, Missouri

1. INTRODUCTION

The purpose of a five-year review (FYR) is to determine whether the remedy at a site is protective of human health and the environment. The FYR report documents the methods, findings, and conclusions of a review including any identified issues and recommendations to address them.

The U.S. Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (Department) have collaboratively prepared this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section (104) or (106), the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The NCP, 40 C.F.R. § 300.430(f)(4)(ii), states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

This FYR for the Valley Park TCE site (Site), located in Valley Park, St. Louis County, Missouri, was conducted from April 2008 through July 2008. The review was jointly conducted by EPA and the Department (the Agencies). This is the second FYR for the Site. The first FYR was approved on September 26, 2003. The approval date of the first FYR is the trigger date for this FYR. The FYRs continue because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

This second FYR report summarizes:

- Site background information
- Remedial action activities
- Performance and operational monitoring results
- Site inspections
- Data reviews
- Remediation progress and status at the Site

2. SITE CHRONOLOGY

Event	Date
Site Discovery	July 1982
City Began Treating its Water Supply	1982
Final Listing on the National Priorities List	June 10, 1986
Department Conducts Limited Remedial Investigation/Feasibility Study (RI/FS)	1987
City Connected to Alternate Water Supply Source	1988
First Five-Year Review	September 2003
Second Five-Year Review	September 2008
Wainwright Operable Unit (WOU):	
Administrative Order on Consent Signed to Conduct Soil Removal on Wainwright Industries' Property	August 7, 1990
Administrative Order on Consent Signed to Conduct RI/FS	May 22, 1991
Human Health Risk Assessment for WOU Completed	December 15, 1993
RI/FS Completed	September 29, 1994
Record of Decision Signed for WOU	September 29, 1994
State Consent Decree Signed to Conduct Remedy	February 28, 1996
Original Soil and Groundwater Designs Completed	September 22, 1998 September 29, 1998
Revised Soil Design Completed	March 1999
Ex-situ Soil Vapor Extraction (SVE) Remedial Action Completed	April 4-5, 1999
Original Groundwater Extraction & Treatment System (GETS) Startup	Fall 1999

Event	Date
GETS and SVE System Restart	Summer 2003
Conduct In-well Treatment for Restoring Yield in Extraction Well Using Chemical Cleaning/Removal Techniques and Electrical and Mechanical Well Components Testing	January 2006 To October 2007
GETS and SVE Performance Monitoring	December 2003 To Present
Start of Performance Study to Evaluate SVE and GETS Processes	April/May 2006 To Present (combined with annual sampling after 2006)
Institutional Control for OU3, by Use of a Deed Restriction placed on the Formerly Owned Wainwright Industries, Inc. Property by the Current Property Owner to Prohibit the Installation and Operation of Groundwater Supply Wells as Specified under the Consent Decree Between Wainwright and the Department	June 2007
Operable Unit 2 (OU2)	
RI/FS Conducted	April 17, 1997 to September 26, 2001
Record of Decision Signed for OU2	September 26, 2001
Unsuccessful Negotiations with Responsible Parties	Fall 2001 to Fall 2002
Remedial Design	November 2003 to April 2005
Record of Decision Change Using an Explanation of Significant Differences	August 2005
Remedial Action Construction	October 2005 to August 2006
Construction Completion	September 2006
Operational and Functional Period	August 2006 to Present
SVE Study to Identify Problem with As-built System	November 2006 to May 2007
Most Recent Site Visit by EPA Project Manager	January 9, 2008
Sampling Event Conducted by the Department	January 2008
Sampling Event Conducted by the Department	February 2008
Sampling Event Conducted by the Department	April 2008
Five-Year Review Notice Published	May 14, 2008

3. BACKGROUND

Physical Characteristics

The Site is located in the city of Valley Park, Missouri, which is approximately 15 miles southwest of the city of St. Louis, in St. Louis County, Missouri (refer to Figure 1). Valley Park is located in the Meramec River Valley and consists of primarily residential and commercial/industrial buildings with an approximate population of 4,165. The Site is located in a portion of the flood plain of the Meramec River (Figure 2).

The Site has been managed as three Operable Units (OUs). The three OUs are: (1) OU1 – contaminated soils on the property formerly owned by Wainwright Industries, Inc. (Wainwright) at 224 Benton Avenue and properties adjacent at 218 and 220 Benton Avenue, 219 and 233 Vest Avenue, and 314 and 318 3rd Street; (2) OU2 – Valley Park Proper east of Highway 141 including the area-wide groundwater plume as well as contaminated soils and groundwater on property owned by Valley Technologies, Inc. (Valley Technologies); and (3) OU3 – contaminated groundwater on the property formerly owned by Wainwright. Refer to Figure 2 for a map showing the Site, OU locations, and the area-wide plume. OU1 and OU3 are commonly referred to as the Wainwright Operable Unit (WOU). Throughout this FYR report, sections of the report will be subdivided into WOU and OU2.

As shown in Figure 2, the area-wide groundwater plume addressed by OU2 extends east from Highway 141, north of the Meramec River, west of 9th Street, and south of the railroad just north of Leonard Avenue. In previous reports, the area-wide plume has been shown to extend east of 9th Street and to the Kirkwood water supply wells due to the potential for groundwater contamination to migrate that direction. However, groundwater contamination due to this Site has not been found east of 9th Street to date.

Land and Resource Use

The Site is located within the eastern portion of Valley Park on the east side of Highway 141. Historically, the area includes both residential and commercial properties. In the short term, projected future land uses for the area are expected to be the same as the historic uses which have been primarily commercial and residential. As a result, the health requirements must meet residential use for soil and groundwater. The 2006 completion of the Meramec Flood Levee is expected to eliminate flooding. The levee may lead to future development according to Valley Park, but such a change in the future land use is unknown.

The groundwater aquifer underlying the Site is not currently used as a drinking water source by Valley Park, but it was used until the early 1980s when contamination was discovered. Further, the city of Kirkwood uses groundwater to the east of the Site for public use and consumption. Commercial operations, such as the Reichhold Chemical Company, use the aquifer for commercial needs. Past investigations have documented that local groundwater flow directions are controlled by commercial wells. If the commercial wells are not operating, the natural flow direction is east toward the city of Kirkwood's drinking water well field.

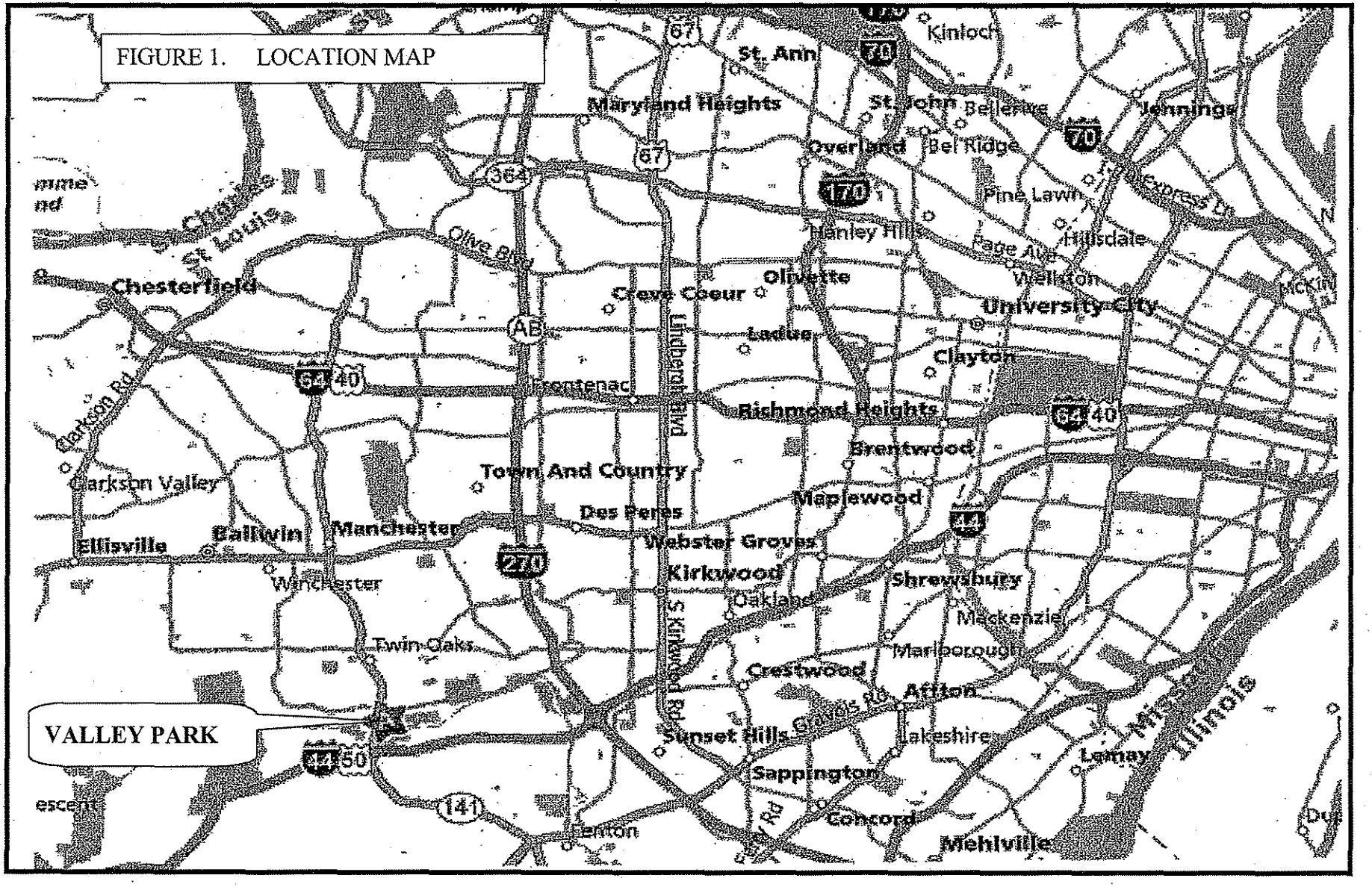
FIGURE 1. LOCATION MAP
VALLEY PARK
St. Louis
Chesterfield
Clarkson Rd
Clarkson Valley
Ellisville
Baldwin
Manchester
Winchester
Twin Oaks
Olive Blvd
Creve Coeur
Olivette
Ladue
Frontenac
Town And Country
Des Peres
Lindbergh Blvd
S Kirkwood Rd
Kirkwood
Oakland
Webster Groves
Maplewood
Richmond Heights
Brentwood
Clayton
University City
Wellston
Pine Lawn
Hillsdale
Hanley Hills
Overland
Bel Ridge
St. John
Bellerive
Jennings
Kinloch
St. Ann
Maryland Heights
Shrewsbury
Mackenzie
Marlborough
Crestwood
Affton
Lakeshire
Lemay
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70
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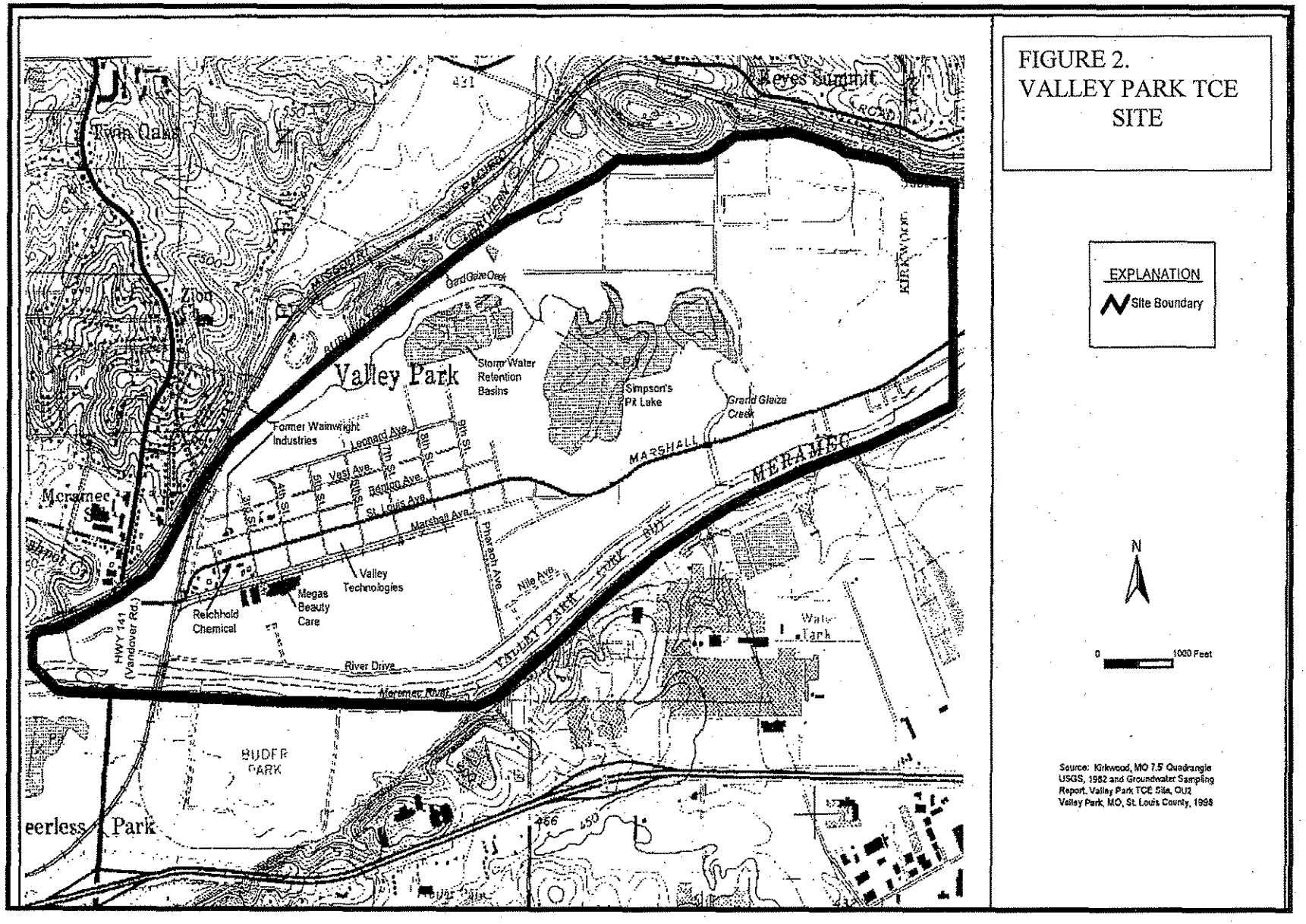


FIGURE 2.
VALLEY PARK TCE SITE

History of Contamination

WOU

Wainwright owned and operated a metal stamping and tool and die shop at the property located on the northwest corner of the intersection of 3rd and Benton from 1949 to 1979. Part of the manufacturing process included a solvent degreasing system that used the solvents trichloroethylene (TCE) from 1963 to 1970 and perchloroethylene (PCE) from 1970 to 1979. These chemicals were stored in a 1,000-gallon above-ground storage tank formerly located directly behind the main building. Neighbors and a former employee reported a hose was used to dispose of liquids daily from the rear of the building onto the surface. In 1988, soil sampling results showed PCE, TCE, and trichloroethane (TCA) on Wainwright's property as high as 42,000 parts per billion (ppb); 8,400 ppb; and 330 ppb, respectively. In 1989, Wainwright's contractor reported soil levels of PCE and TCE as high as 2,200,000 ppb and 540,000 ppb, respectively.

OU2

Beginning in 1954, Valley Technologies operated two divisions in Valley Park, Missouri—Precision Forgings and Valley Heat Treat—until it began operating solely as Valley Technologies. Precision Forgings manufactured aluminum pressings, and Valley Heat Treat provided heat treatment services on metal parts. Valley Heat Treat utilized a degreaser that used the solvents TCA and TCE through the years of operation. Wastes from the degreaser were placed in steel drums and stored on a gravel lot for pickup and disposal. An officer of Valley Technologies estimated that 150 gallons may have spilled over the years. In addition, several employees reported regular spillage of wastes from drums onto the gravel lot, burial of drums containing wastes, and cleaning solvents released directly onto the ground.

Initial Response

During routine sampling by the Department's Public Drinking Water Program in June 1982, one of Valley Park's municipal water supply wells was found contaminated with TCE, PCE, and various other chlorinated organic compounds. From April 1983 through March 1986, the Department periodically sampled Valley Park's three municipal water supply wells. During that time period, samples from all three wells showed that TCE concentrations exceeded the maximum contaminant level (MCL) for drinking water as determined by the Safe Drinking Water Act (SDWA). Elevated concentrations of PCE and other chlorinated organic compounds were also detected in these wells. After learning of the contamination, Valley Park first aerated the water to remove the contaminants; in 1986, Valley Park abandoned the wells and connected to the St. Louis County Water Company.

Between May 1984 and September 1987, a limited Remedial Investigation (RI) was conducted by the Department to determine the potential sources of the chlorinated hydrocarbon contamination and to characterize the contamination of the Valley Park groundwater.

The Site was listed on the National Priorities List (NPL) in 1986. In 1990, through an Administrative Order on Consent (AOC) with EPA, Wainwright agreed to perform a soil removal on their property to 20 parts per million for TCE and PCE. Wainwright could not meet the cleanup level and requested that the AOC be suspended. To receive approval from the Agencies to suspend the removal action, Wainwright agreed to conduct an RI/Feasibility Study (FS) on their property. The RI/FS was completed and in September 1994, a Record of Decision (ROD) was issued for WOU.

The Department conducted two groundwater investigation sampling events in May and November 1995 which are designated as the beginning of the RI for OU2. Negotiation efforts with Wainwright and Valley Technologies were unsuccessful in reaching an agreement for those companies to conduct the RI/FS. Thus, the Department conducted the RI/FS for OU2 from 1997 to 2001 using EPA funding and technical support. The study concluded with the 2001 ROD for OU2.

Basis for Taking Action

CONTAMINANTS AND MEDIA

The following is a list of the hazardous substances which were identified in the RI/FS as the primary contaminants of concern in soil and groundwater at WOU and OU2.

Soil	**Groundwater**
Benzo(*a*)pyrene – WOU only	**Barium – WOU only**
Tetrachloroethylene (PCE) – WOU only	**Manganese – WOU only**
Trichoroethylene (TCE)	**Methylene Chloride**
Trichlorethane (TCA) – OU2 only	**Tetrachloroethylene (PCE) – WOU only**
	Trichoroethylene (TCE)
	Trichlorethane (TCA)

Post ROD for WOU, benzo(a)pyrene in soil was determined to be attributed to asphalt surfaces and not due to waste disposal practices. Also post ROD for WOU, barium and manganese were thought to be natural background levels and attributed to sampling methods during the RI/FS.

EXPOSURES

Exposures to soil were found to not present a direct contact threat at OU2. For WOU, unacceptable direct contact threats to soils were identified for both residential and industrial settings.

For both WOU and OU2, potential risks associated with exposure to groundwater were attributed to the presence of the primary contaminants PCE, TCE, and TCA including their degradation by-products—dichloroethylene (DCE), dichloroethane (DCA), and vinyl chloride—at levels which exceed the Federal Safe Drinking Water Act MCLs.

Unacceptable air exposures to contaminants for WOU and OU2 were identified due to the potential of contaminated groundwater to be used in showers via a public water supply. In addition for OU2, potential unacceptable ambient air exposures were identified due to an uncontrolled release of contaminants from industrial use of the contaminated groundwater at the Reichhold Chemical and Megas Beauty Supply properties.

Current environmental exposures to contaminants were not identified for either WOU or OU2 during the RI/FS processes.

4. REMEDIAL ACTIONS

Remedy Selection

WOU

The ROD for WOU was signed on September 29, 1994. The ROD selected an action to address contamination sources—both soil and groundwater. The Remedial Action Objectives (RAOs) for WOU were identified as: (1) eliminate the soil source contaminating the groundwater, and (2) hydraulically control and eliminate the groundwater contamination located on the Site. The major components of the remedy selected in the WOU ROD include the following:

- Soil vapor extraction (SVE) throughout the identified areas of Volatile Organic Compound (VOC)-contaminated soil.

- Excavation and disposal off-site of polycyclic aromatic hydrocarbon (PAH)-contaminated surface soils.

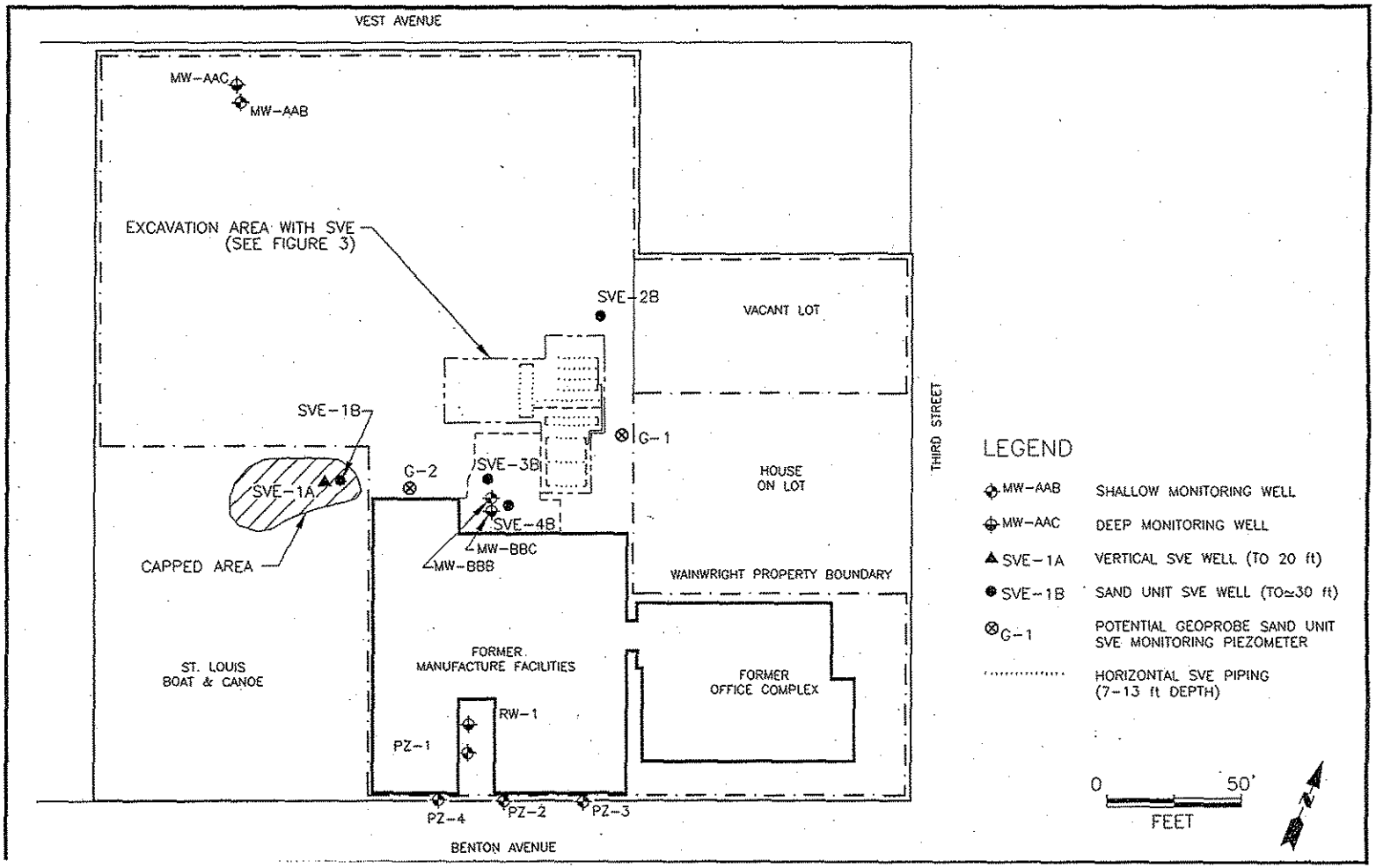
- Installation of a groundwater extraction and treatment system (GETS) to hydraulically control the vertical section of the aquifer underneath WOU and to restore the groundwater to drinking water MCLs. Air stripping technology will be utilized to treat the groundwater before discharging to the sewer system.

- Air sparging initially was proposed to enhance the groundwater cleanup process; however, it was subsequently removed through an Explanation of Significant Difference (ESD) document due to concerns that the air sparging could induce contaminant migration off-site.

- A deed restriction to be placed on WOU properties to prohibit the installation and operation of groundwater supply wells.

- Groundwater monitoring including existing and new groundwater monitoring wells to assess the effectiveness of the remediation. The WOU is shown in Figure 3.

FIGURE 3. WAINWRIGHT OPERABLE UNIT



OU2

The ROD for OU2 was signed on September 26, 2001. The RAOs were identified as (1) remove the soil source on the Valley Technologies' property, (2) hydraulically control and remove the groundwater contamination located beneath the Valley Technologies' property, and (3) control air emissions of contaminants emitted from commercial wells located within the area-wide contaminated aquifer.

The major components of the remedy selected in the ROD include:

- On Valley Technologies' property, excavation of shallow soils to a depth of 16 feet or less and treatment using ex-situ SVE.

- On Valley Technologies' property, in situ SVE to remediate deep, contaminated soils below 16 feet.

- On Valley Technologies' property, groundwater extraction and treatment using air stripping to hydraulically control the impacted groundwater and to achieve drinking water standards in the aquifer. The treated water will be reinjected downgradient to help in preventing migration of contaminants toward Kirkwood.

- An Institutional Control (IC) on the Valley Technologies' property and area-wide plume to prohibit installation and operation of wells until the aquifer is clean.

- Groundwater monitoring to assess effectiveness of the soil and groundwater treatment systems.

- Installation of air emission controls on commercial wells using the contaminated aquifer.

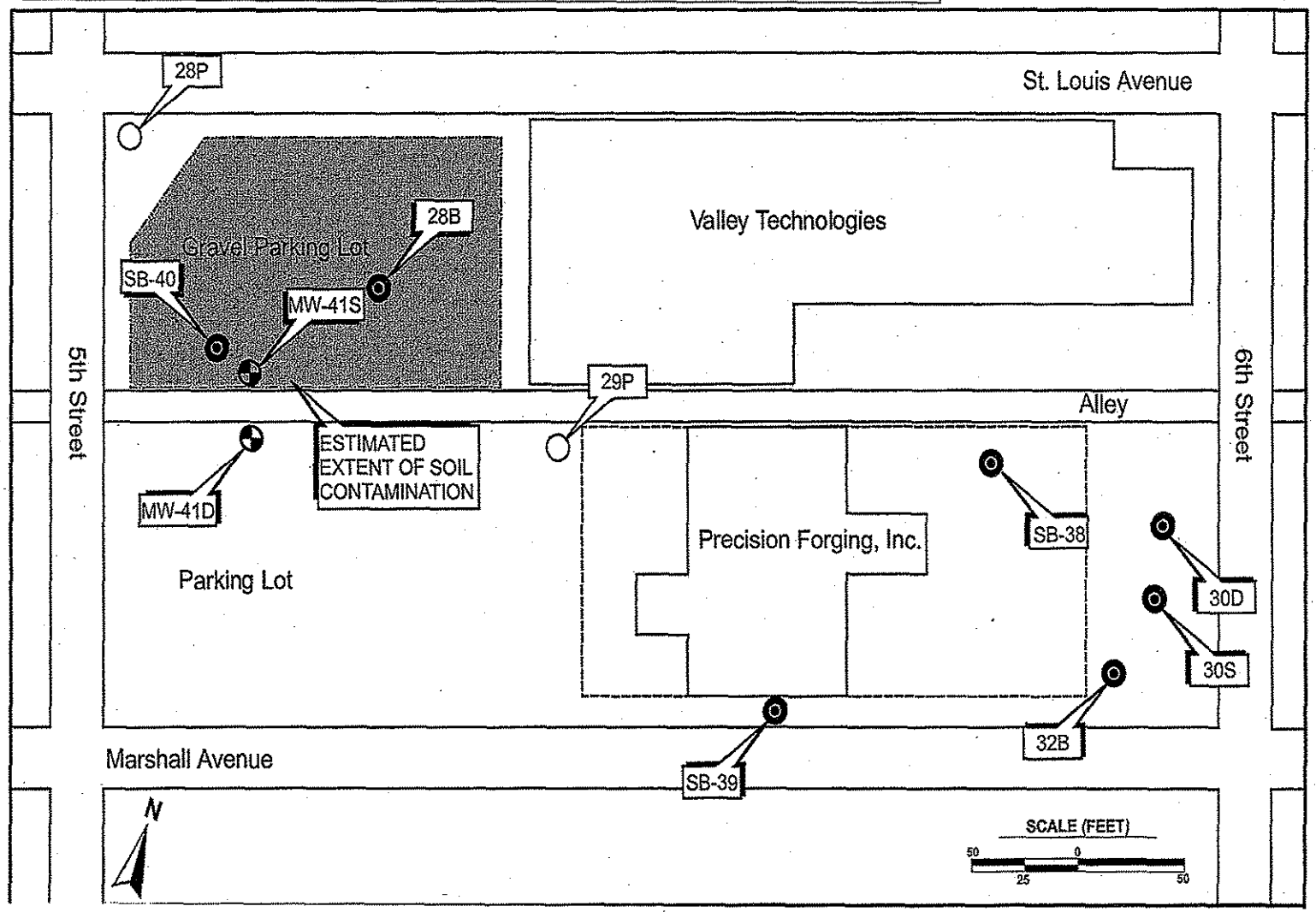
The Valley Technologies' source area is shown in Figure 4.

Remedy Implementation

WOU

Following the signing of the ROD, the Department began negotiations with Wainwright to conduct the specified soil and groundwater remedial actions. During those negotiations, Wainwright and the Department, with EPA's concurrence, agreed to modify the ROD as documented in an April 1996 ESD. The most significant modifications included (1) the treated groundwater could be discharged into the storm sewers rather than the sanitary sewers; (2) air sparging would be eliminated; (3) on-site, ex-situ SVE would be used to treat excavated soils rather than in situ SVE; and (4) soils contaminated with semivolatile organic compounds exceeding the direct contact risk level would be excavated, treated, and buried on-site or transported to an off-site facility, as opposed to being excavated and hauled off-site for treatment.

FIGURE 4. VALLEY TECHNOLOGIES PROPERTY DURING RI/FS



The design of the soil remedy was originally approved in September 1998. The approved design involved constructing and operating an ex-situ SVE system located within the former Wainwright building. Contaminated soil would be excavated and placed in the SVE system. Design details were presented to the public in an availability session hosted by the Department and Valley Park officials. Some residents living adjacent to the former Wainwright property expressed concerns about treating contaminated soil in the building. The main concern was that a flood could wash contaminated soil out of the building and onto neighboring properties even though the design required Wainwright to develop a flood contingency plan listing measures to be taken to prevent the release of soils from the building. In fall 1998 and as a result of residents' concerns, Wainwright proposed changing the ex-situ SVE process from a fixed treatment cell design located within the building to a steam-enhanced mobile unit. The new approach would complete the cleanup within a couple months rather than a couple years. As a result, the potential for flooding complications would be reduced significantly. The proposal was accepted by the Agencies, and the redesign was approved in March 1999.

In 1999, approximately 600 cubic yards of contaminated soil were treated using ex-situ SVE, and GETS was constructed and started. However, in December 1999 during routine sampling, the Department discovered methyl tertiary butyl ether (MTBE) in the GETS influent and effluent streams, resulting in suspension of operation until the MTBE source could be investigated.

Extensive delays occurred due to the MTBE complication. Eventually, the source of the MTBE was identified; but the MTBE responsible party, Geldbach Petroleum, was not cooperative in remediating the problem. Wainwright's concern was the potential for GETS to pull the MTBE plume onto WOU thereby exacerbating the MTBE contamination. Numerous design submittals followed exploring various possible solutions to addressing WOU and MTBE contamination; this process spanned several years. In 2003, all parties agreed on an approach to modify the air stripper system and to reduce the extraction flow in an effort to restart GETS with minimal influence on the MTBE plume. By July 2003, an approved design was in place; GETS was restarted in August 2003. Initial influent and effluent samples indicated effective removal of contaminants through the use of the air stripper and minimal MTBE complications. Groundwater monitoring data collected in December 2003 indicated that MTBE groundwater concentrations had declined to near nondetect levels.

A ROD requirement for WOU remedial actions included a deed restriction to be placed on WOU by the property owner to prohibit the installation and operation of groundwater supply wells as long as the groundwater was contaminated above drinking water standards. The Department will work to have the current property owner place a restrictive covenant on its property restricting the construction of houses or sinking of drinking water wells under state law until groundwater meets MCLs.

OU2

In 2002, Wainwright and Valley Technologies declined the opportunity to conduct the OU2 remedial activities. As a result, EPA assumed the lead role in 2003 to conduct the fund-lead remedial design, construction, and long-term remedial action. The design was completed in 2005

and required changes to the original remedy as specified in the OU2 ROD. In 2005, an ESD document defined the changes:

- Ex-situ SVE of surface soils was replaced with off-site disposal due to the fact that Valley Technologies had sold the open portion of their property which was required to implement the ex-situ SVE operation.

- Installation of air strippers on the Reichhold Chemical and Megas Beauty Supply properties was eliminated based upon air modeling and verification sampling documenting that no unacceptable, health-based risks were present.

- Treated groundwater from the Valley Technologies' property would be discharged to a storm sewer system pursuant to a National Pollution Discharge Elimination System (NPDES) permit. The original decision involved reinjection of treated groundwater. This change was made mainly for implementability and maintenance reasons.

Also in 2005, EPA awarded a construction contract and completed a State Superfund Contract with the Department. The OU2 remedial construction activities began in fall 2005.

By January 2006, the soil excavation on the Valley Technologies' property was completed with approximately 5,000 cubic yards of contaminated soils sent to permitted landfills. A treatment building, SVE wells, groundwater monitoring wells, and the groundwater extraction well installation were completed during spring 2006. Installation and testing of the SVE and groundwater treatment systems were completed during summer 2006. Prefinal and final construction inspections were conducted during August 2006. The Operational and Functional (O&F) phase started in August 2006.

Operation and Maintenance

WOU

With the Department's oversight, Wainwright is conducting the operation and maintenance (O&M) activities at WOU according to the O&M Plan for SVE and GETS. The O&M Plan was approved by the Agencies in May 2003. The primary activities associated with O&M include the following:

- Normal operation and monitoring to ensure effective removal of contamination using both systems.

- Equipment monitoring and inspection as part of the normal maintenance procedures and schedules.

- Recordkeeping and reporting requirements including quarterly reporting of operational status, personnel changes, and safety issues.

- Sampling and chemical analysis of SVE influent, GETS influent and effluent, and groundwater monitoring wells.

The annual O&M costs listed in Table 1 for the second five years were primarily associated with operating costs and consulting fees. Operating costs consisted of Site labor, lab fees, utilities, administrative support, and maintenance repairs. Repairs were higher in years that required replacement of the SVE fan, operating pump repairs, and capacity restoration activities on the extraction well. In calendar year 2004, overall costs increased considerably after startup of the treatment systems in 2003.

Table 1. Annual O&M Costs for WOU

Time Period (yearly except where noted)	**Cost (rounded to nearest $1K)**
October 1, 2003 to December 31, 2003	$28,000
January 1, 2004 to December 31, 2004	$75,000
January 1, 2005 to December 31, 2005	$76,000
January 1, 2006 to December 31, 2006	$81,000
January 1, 2007 to December 31, 2007	$77,000
January 1, 2008 to September 30, 2008*	$53,000

* Estimate projected to end of period

OU2

An O&M Plan for OU2 was approved in August 2006. The O&M Plan is a comprehensive document to specify how to operate and monitor the remedial action. The scope of the O&M Plan includes the groundwater treatment system, the groundwater monitoring network, the asphalt cover, and the in situ SVE system. An EPA contractor operates and manages the remedial systems.

The Department collects groundwater and air samples, performs chemical analyses, and submits reports to EPA to monitor the performance of the remedial systems.

Because EPA is the lead agency and funding the remedial action for OU2, the project will enter the long-term remedial action phase for a maximum of ten years following successful completion of the O&F phase as allowed pursuant to 40 C.F.R. § 300.435(f)(3). If necessary, the project will change to the O&M phase at the end of the long-term remedial action phase; the Department will assume lead and funding responsibilities.

The O&F phase for OU2 began in August 2006 with completion of the construction phase. Typically, the O&F phase is expected to run for one year to verify that the constructed project is meeting the design and ROD requirements. During the 20 months since startup, the GETS, the groundwater monitoring network, the asphalt cover, and the computer control system have operated as designed. However, the O&F phase has been extended by EPA in accordance with

40 C.F.R. § 300.435(f)(3) beyond one year because the SVE system is not operating as intended. The purpose of the SVE system is to remove soil contamination below the surface which can potentially migrate into and contaminate the groundwater. The ten-year goal for groundwater cleanup will not be achieved without the soil source removed.

EPA has conducted an analysis of the SVE problem, and the results of that evaluation are presented in Section 6 of this report.

The annual long-term remedial action costs for OU2 are listed in Table 2. Operating costs consisted of Site labor, sampling and chemical analysis, utilities, administrative support, and maintenance repairs. EPA changed contracts in June 2008, and projected costs are higher due to more extensive reporting requirements and more extensive sampling/chemical analyses support.

Table 2. Annual Long-term Remedial Action Costs for WOU

Time Period (yearly except where noted)	Cost (rounded to nearest $1K)
September 2006 thru August 2007	$120,000
September 2007 thru May 2008	$110,000
Projected June 2008 thru May 2009	$225,000

5. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

The following protectiveness statement was provided in the last FYR:

> The remedy for WOU was implemented last month, August 2003. For OU2, the remedial action is in the design phase. Once operational, the remedies for both operable units at the Valley Park Site are expected to be protective of human health and the environment. The remedy at the WOU, a pump and treat groundwater system and soil SVE system, will continue to operate until the groundwater is restored to MCLs. The projected time frame to achieve this goal is ten years after full operation starts. The remedy at the OU2 is expected to be protective upon implementation. Currently, the design for OU2 is underway and the remedial actions are scheduled to be operational during 2005. The effectiveness of the systems will be evaluated during the next five-year review period. Long-term protectiveness of the remedial action will be verified by monitoring the groundwater and soil and air treatment systems.

This section presents a discussion of the activities conducted at the Site since the first FYR, i.e., activities performed in response to issues and recommendations identified in the first FYR.

WOU

Two issues were identified in the previous FYR that could impact the protectiveness of the remedy: (1) operation of GETS without delay, and (2) full operation of the SVE system. The two

issues were determined to be imperative for the remedy to be protective. These issues, the recommendations, and the follow-up actions are summarized in this section.

GETS Operation

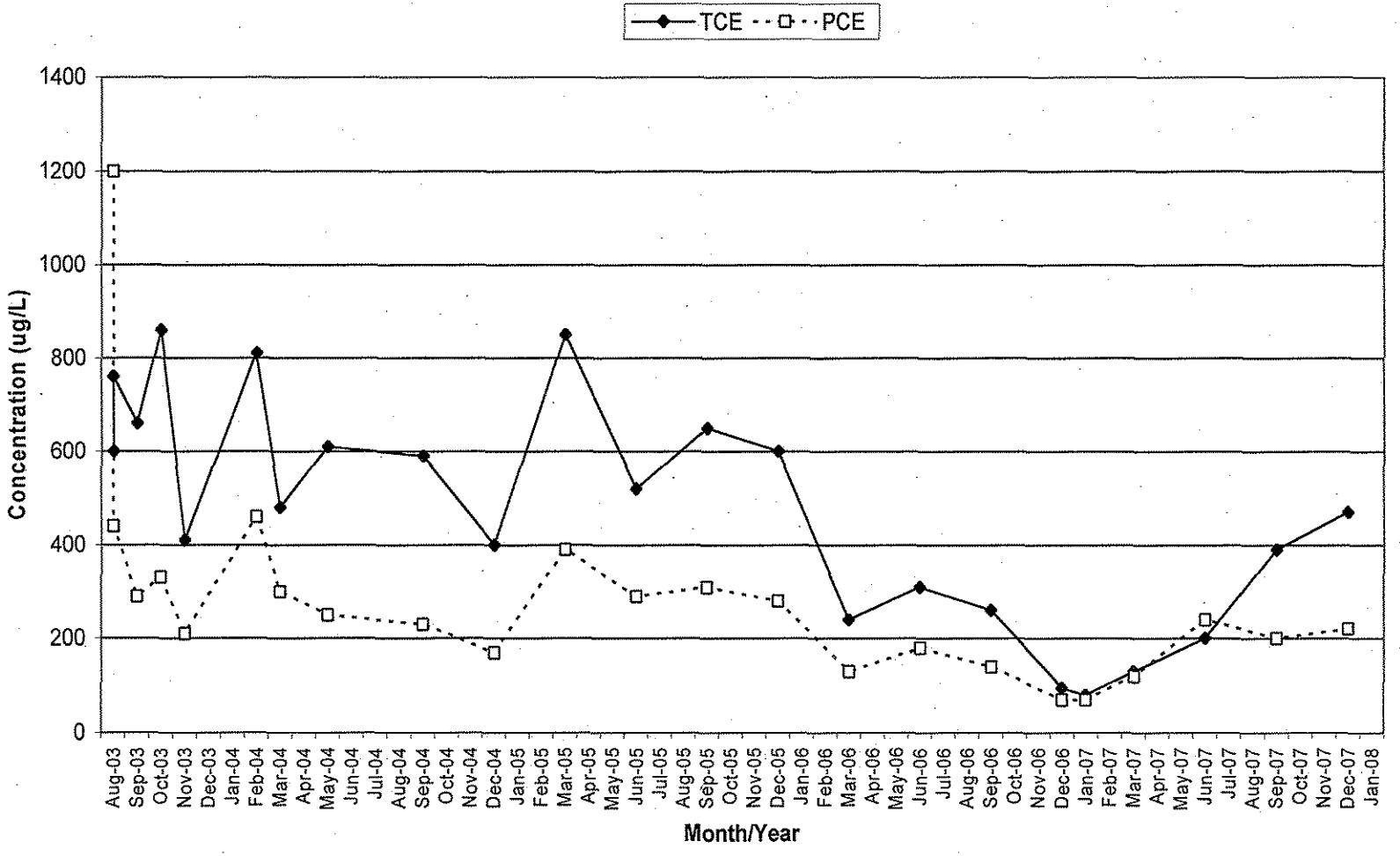
Extensive delays occurred due to the inability of GETS to properly treat MTBE-contaminated groundwater. Essentially, the source of the MTBE was identified, but the responsible party was not cooperative in remediating the problem. Concerns were raised about the potential for GETS to pull the MTBE plume onto the WOU thereby exacerbating the MTBE contamination. Numerous design submittals followed exploring various possible solutions to addressing the WOU and MTBE contamination; this process spanned several years. By 2003, all parties agreed on an approach to modify the air stripper system and to reduce the extraction flow in an effort to restart GETS with minimal influence on the MTBE plume. In July 2003, an approved design was in place; GETS was restarted in August 2003. Initial influent and effluent samples indicated effective removal of contaminants by the air stripper and minimal MTBE complications. GETS became fully operational on August 21, 2003. Groundwater monitoring data collected in December 2003 indicated that MTBE concentrations had declined to near nondetection levels.

After approximately six months of operation at the reduced flow rate of 50 gallons per minute (gpm), GETS could be operated at the designed pumping rate of 100 gpm. In May 2004, the system flow rate was increased to the well's full capacity which was only 75 gpm.

Regardless of the changing pump rate utilized by GETS, the effluent chemical concentrations have consistently achieved criteria specified by the NPDES permit. Specifically, influent VOC concentrations have ranged from approximately 10,000 ppb total VOCs in September 1999 to 754 ppb total VOCs in November 2003 and 732 ppb in December 2007 (refer to Figure 5). The effluent VOC concentration has been below 2 ppb resulting in greater than 99 percent removal efficiency.

Using the baseline groundwater data obtained in September 1999, the initial total VOC concentration was approximately 10,000 ppb in the influent to the air stripper. After the delay due to the MTBE, the influent contamination level had dropped to approximately 2,130 ppb for total VOCs. Since 2003, a slight downward trend has occurred in the total VOC level for the plant influent as shown in Figure 5. The influent concentration decreased significantly during 2006 and early 2007; in late 2007, the concentration returned to 2005 levels. This roller coaster trend is probably associated with the well flow rate problems as discussed in the next paragraph of this section of the report.

FIGURE 5. CONTAMINANT CONCENTRATION TRENDS IN WOU EXTRACTION WELL



Beginning in February 2006, the pumping rate in the WOU extraction well decreased from approximately 75 gpm to less than 50 gpm by March 2006. A decrease in the pumping rate is a common problem for long-term pumping systems and can result from screen incrustation and/or biological fouling. Corrosion is another cause of a reduction in well output performance that can lead to screen failure, silt formation, and pump damage. To address the cause of the low pumping rate, the following actions were undertaken:

- A closed loop test of the pump system and back flush of the well casing was conducted. The purpose of the test was to verify pump capacity and attempt to clean the well screens by flushing. Results showed the pump capable of 90-95 gpm sustainable flow in a closed loop system.

- A decision was made that additional well screen cleaning was required to increase the flow. The well screen was cleaned using a proprietary scale and iron removal chemical product. On startup, initial flow increased to 91 gpm but decreased to 74 gpm by April 2006. It was not known why the flow decreased over the three-week period.

- A second well screen cleaning with bleach and lime and scale remover was conducted during an electrical shutdown to repair a defective breaker. During the shutdown, the well pump was found to be defective, but it was not known initially if the defective pump could account for the lower flow. Subsequently, the defective pump was diagnosed as an abrupt electrical failure and not responsible for the low flow.

- A new pump and motor were installed along with new stainless steel piping and fittings in June 2006. The well screens were visually examined above the water line and appeared normal. Upon restart of the pumping system, a measured flow rate of 97 gpm was attained. The effluent pipe control valve was throttled down to 83 gpm to keep from pumping the well dry and to minimize low-water limit trips. The number of low-water limit pump shutdowns was thought to have contributed to the original pump failure.

- By the end of June 2007, the well yield was below 50 gpm again with frequent *low-limit* shutdowns. Due to these problems, two well service companies were contacted for assistance in diagnosing the problem. Based on the recommendations from one company, a similar cleaning procedure to one attempted previously was proposed that will withdraw the well pump and pipe network and use a more aggressive cleaning regimen of the well screens. A proposal is currently being developed by the contractor to perform another cleaning procedure using more aggressive, regenerative treatment options.

- To assess the cause of the low-limit shutdowns, water levels were monitored to see if a correlation exists between water level above the screen and the flow rate for the extraction well. From June 2006 to June 2007, water levels were taken at piezometer well PZ-1 and varied by eight feet in depth. Recorded low-limit system trips occurred at all water levels. Thus, the reduced flow rate is believed to be due to a gradual degradation of the water inflow across the screens in the well casing.

The Department is concerned that a reduction in the GETS extraction well pumping rate has impaired the effectiveness of the hydraulic control of the groundwater beneath WOU. Effectiveness is assessed by evaluating water levels and groundwater quality. In May 2007, concentrations of TCE and PCE detected in monitoring well MW17C, located 225 feet downgradient from the WOU source area, increased to 47.8 ppb PCE and 13.6 ppb TCE from previous nondetection levels in 2006 (refer to Table 4 for a WOU summary of monitoring well results and Figure 6 for well locations). The increased downgradient contaminant levels indicate the potential that hydraulic control has not been maintained. Groundwater quality data from other wells that were monitored over this same period are essentially stable.

Tables 3 and 4 summarize groundwater quality results from the last five years (2003 to 2008) for the GETS extraction well and monitoring wells. Groundwater quality data are collected each quarter. Quarterly monitoring reports have been submitted since December 2003 after restarting the treatment systems.

On the basis of quarterly results, Figure 5 was developed depicting the trend in influent groundwater concentration with time. The trend indicates that the influent concentration has decreased since December 2003 but exhibits a very noticeable upward trend beginning in early 2007. Before early 2007, VOC concentration levels suddenly decreased during 2006. The reason for the decrease is being investigated. One possible cause is the reduction in well capacity in the extraction well. The work conducted on the well in late 2006 and early 2007 may have improved the local hydraulic control which resulted in concentrations returning to pre-2006 levels.

Although the trend in the GETS extraction well indicates an overall reduction in contamination since 2003, groundwater concentrations measured in monitoring well MWBBC located near the source area are still exhibiting consistently higher concentration levels at approximately 300 ppb PCE and 700-800 ppb TCE excluding the April 2008 sampling event (discussed in next paragraph). The consistently high concentrations suggest the possibility that a soil source is still present and not being addressed by the current SVE system.

The 2008 monitoring well results in Table 4 indicate a substantial increase in concentrations for the monitored contaminants. Spring weather at the time of the April sampling event in Valley Park caused exceptionally high groundwater levels with the nearby Meramec River at almost flood stage. Due to the high local groundwater levels, the data for this sampling event are not representative of normal conditions.

TABLE 3. SUMMARY OF WOU GETS EXTRACTION WELL RESULTS

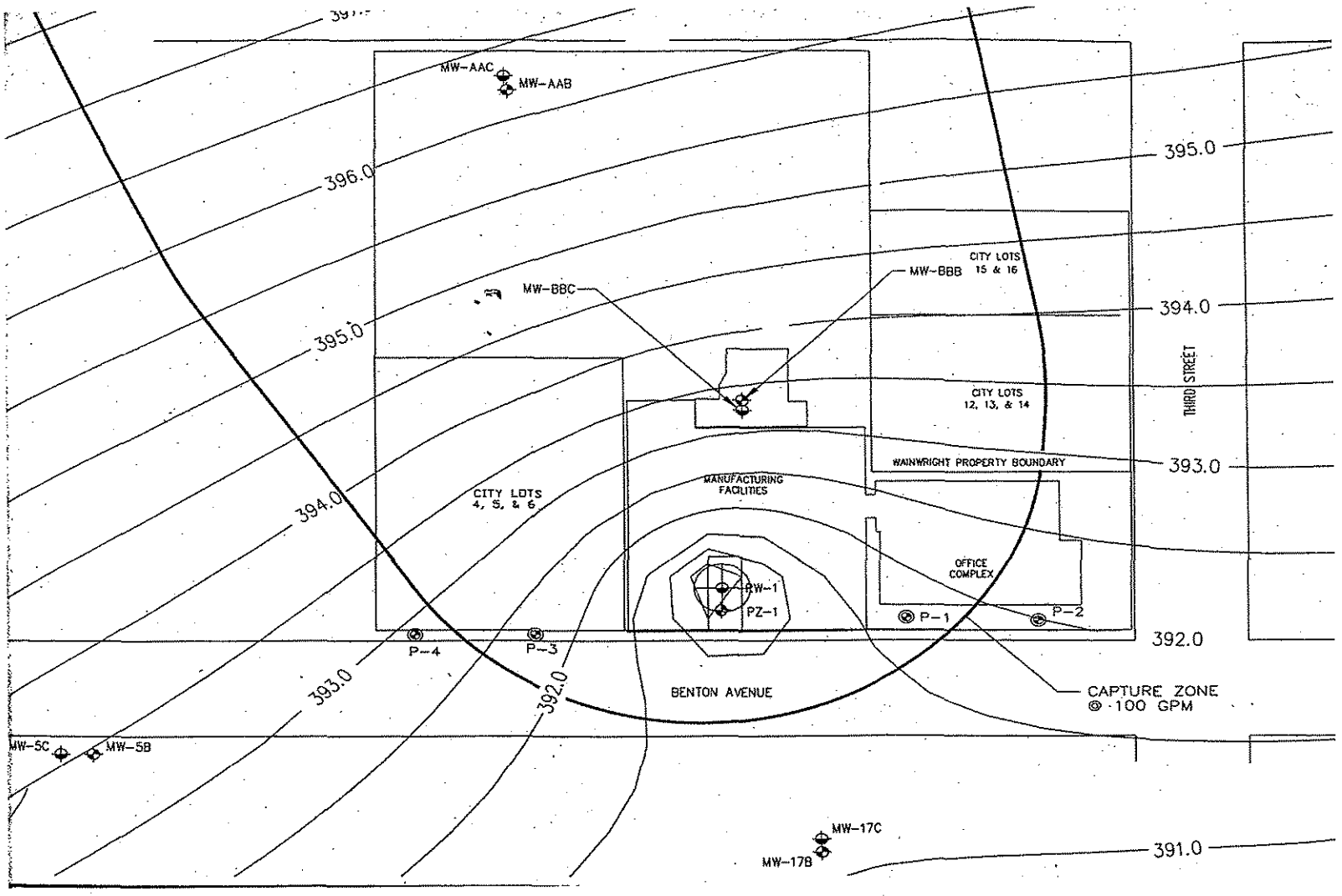
Month/Year	PCE (µg/L)	TCE (µg/L)	Total VOCs (µg/L)*
Aug-03	1200	600	2130
Sept-03	290	660	1140
Oct-03	330	860	1344
Nov-03	210	410	754
Dec-04	170	400	607
Mar-05	390	850	1294
Jun-05	290	520	846
Sept-05	310	650	991
Dec-05	280	600	907
Mar-06	130	240	395
Jun-06	70	95	179
Sept-06	140	260	431
Dec-06	70	95	179
March-07	240	200	508
Sept-07	200	390	635
Dec-07	220	470	660
Mar-08	64	88	165

* Sum of all contaminants and degradation products detected

TABLE 4. WOU MONITORING WELL RESULTS: 2006 TO 2008

Sample Location	PCE Results (µg/l)			TCE Results (µg/l)		
	2006	2007	2008	2006	2007	2008
MWAAC (upgradient)	0.53	ND	ND	2.94	1.92	2.62
MWBBC (source area)	278	288	416	729	791	1800
MW5C (crossgradient)	0.61	0.91	1.33	3.11	3.81	5.46
MW17C (downgradient)	ND	47.8	42.8	ND	13.6	21.7

Figure 6. WOU Monitoring Well Locations
(Figure produced from design computer model; not actual water elevations presented)



In situ Soil Vapor Extraction Operations

In the ROD for WOU, *in situ* SVE was selected to address the subsurface soil contamination. The primary goal of the SVE system is to expedite the groundwater treatment process by reducing subsurface soil contamination to achieve performance standards that are protective of groundwater. In addition, the ROD specified that the SVE system must operate at a sufficient removal rate to achieve the soil cleanup standards within a ten-year time frame.

The SVE system is currently operating to remediate shallow silty-clay and deeper sand-gravel soil units. The area of WOU where the SVE system is operating is covered by asphalt-paving material which is used as a parking lot. The layout and features of the SVE system are shown in Figure 3.

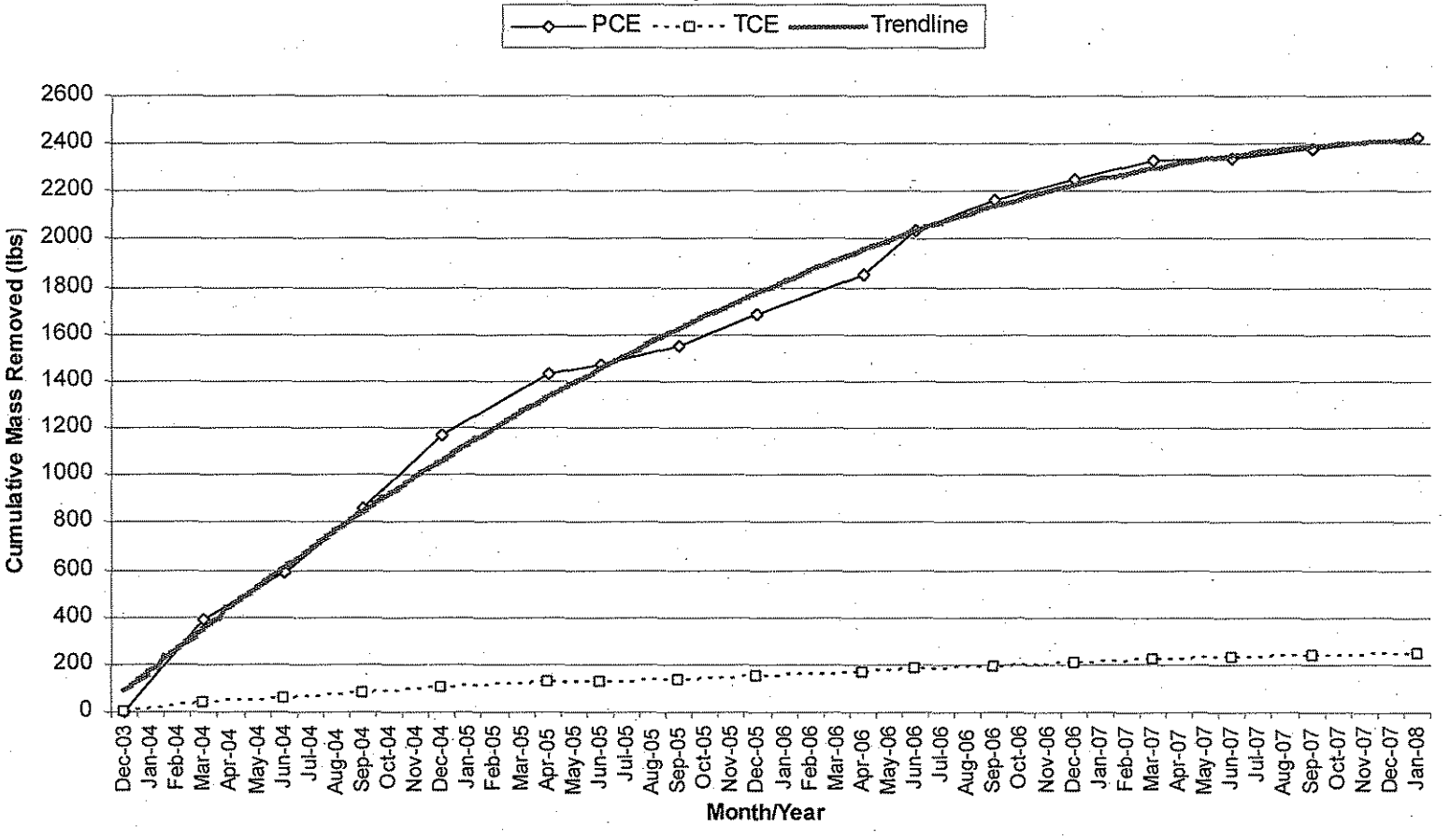
On the basis of available SVE performance data, it is estimated that 2,427 pounds of PCE and 243 pounds of TCE have been recovered. Progress since the last FYR is satisfactory based on the amount of TCE and PCE that has been recovered and the fact that the SVE operations resumed in August 2003. While these data represent a significant overall mass removal, the current rate at which mass is being removed is low with correspondingly high groundwater concentration levels. Preliminary soil, soil gas/vapor, and SVE sampling events conducted in 2006 and 2007 indicate the possibility that the full extent of soil contamination is not defined and/or is not being addressed by the current operation of the SVE system. Further evaluation of the SVE system and possible remaining soil source contamination is required to determine if the SVE system should be expanded or improved.

A concern with the SVE system is that it is currently operated at reduced flows when compared to documented pilot testing at the Site. Since 2003, quarterly report data indicate an average total flow rate from all venting wells of 49 standard cubic feet per minute (cfm) with a minimum of 36 cfm in December 2005 and a maximum of 63 cfm in April 2006. This compares to documented vent testing results for the following wells: SVE-2B, sand unit, 30 cfm; horizontal, clay unit, 45 cfm; SVE-1B, sand, 70 cfm; and MWBBB, sand, 65 cfm (flow testing by Philip Industrial Services Group, January 14, 2000). At this time, the cause is unknown why the average flow is consistently lower than that attainable from actual field testing, but it is possible it may be due to water entrainment in the SVE vent lines. If this is the cause, an assessment of the impact on remedy performance should be conducted.

Implementation of Institutional Controls

IC implementation was not an issue identified in the last FYR because it was reported that a deed restriction was placed on the property in fall 1996. However, during preparation of this FYR the Department discovered the IC was not implemented. As a result, in June 2007 a deed restriction was placed on the property by the current owner. It is important to note that no activities prior to 2007 were observed or reported that would have violated the purpose of the deed restriction. Further, EPA will work with the Department to place a restrictive covenant on the affected property.

FIGURE 7. SOIL VAPOR EXTRACTION SYSTEM PERFORMANCE – CUMULATIVE MASS RECOVERED



OU2

The OU2 remedial action was in the design phase at the time of issuance of the first FYR. As a result, the activities performed since the first FYR have included completion of the design, modification of the OU2 ROD, construction of the treatment and monitoring systems, and implementation of the O&F period. This section will summarize each of these activities.

Design and Record of Decision Explanation of Significant Difference

EPA's design was completed in 2005 with oversight and concurrence by the Department. New information was developed during the design which required changes to the original remedy as specified in the OU2 ROD. As a result, a 2005 ESD document defined the changes:

- Ex-situ SVE of surface soils was replaced with off-site disposal due to the fact that Valley Technologies had sold the open portion of their property which was required to implement the ex-situ SVE operation.

- Installation of air strippers on the Reichhold Chemical and Megas Beauty Supply properties was eliminated based upon air modeling and verification sampling which documented that no unacceptable, health-based risks were present.

- Treated groundwater from the Valley Technologies' property would be discharged to a storm sewer system pursuant to a NPDES permit. The original decision was to reinject this treated groundwater. This change was made mainly for implementability and maintenance reasons.

Construction of Remedial Action

Also in 2005, EPA awarded a construction contract and completed a State Superfund Contract with the Department. The OU2 remedial construction activities began in fall 2005.

By January 2006, the soil excavation on the Valley Technologies' property was completed with approximately 5,000 cubic yards of contaminated soils sent to permitted landfills. A treatment building, SVE wells, groundwater monitoring wells, and groundwater extraction well installation were completed during spring 2006. Installation and testing of the SVE and groundwater treatment systems were completed during summer 2006. Prefinal and final construction inspections were conducted during August 2006. The O&F phase started in August 2006.

Refer to Attachment B for photographs showing several key events in the construction process.

Implementation of Operational & Functional Period

The completion of the construction phase meant that all mechanical and electrical equipment were installed, met design specifications, and worked. The O&F period is when the operation of

the systems is optimized and verified to achieve performance standards specified in the ROD. For OU2, the following systems, associated design criteria, and/or performance standards require verification to complete the O&F phase and begin the long-term remedial action phase:

- GETS – The extraction well has pumped at least 180 gpm since startup and demonstrated the capability of reaching in excess of 200 gpm.

  The bag filter system has successfully removed particulates before the air stripper. The bag filters become saturated with iron particulate from the groundwater within one week of continuous operation.

  The air stripper has operated continuously, and effluent samples have documented complete removal of Site contaminants. In two sampling events, ambient air emissions from the exhaust stack have documented Site contaminants below detection levels and risk-based standards.

  The storm sewer discharge has operated without problems.

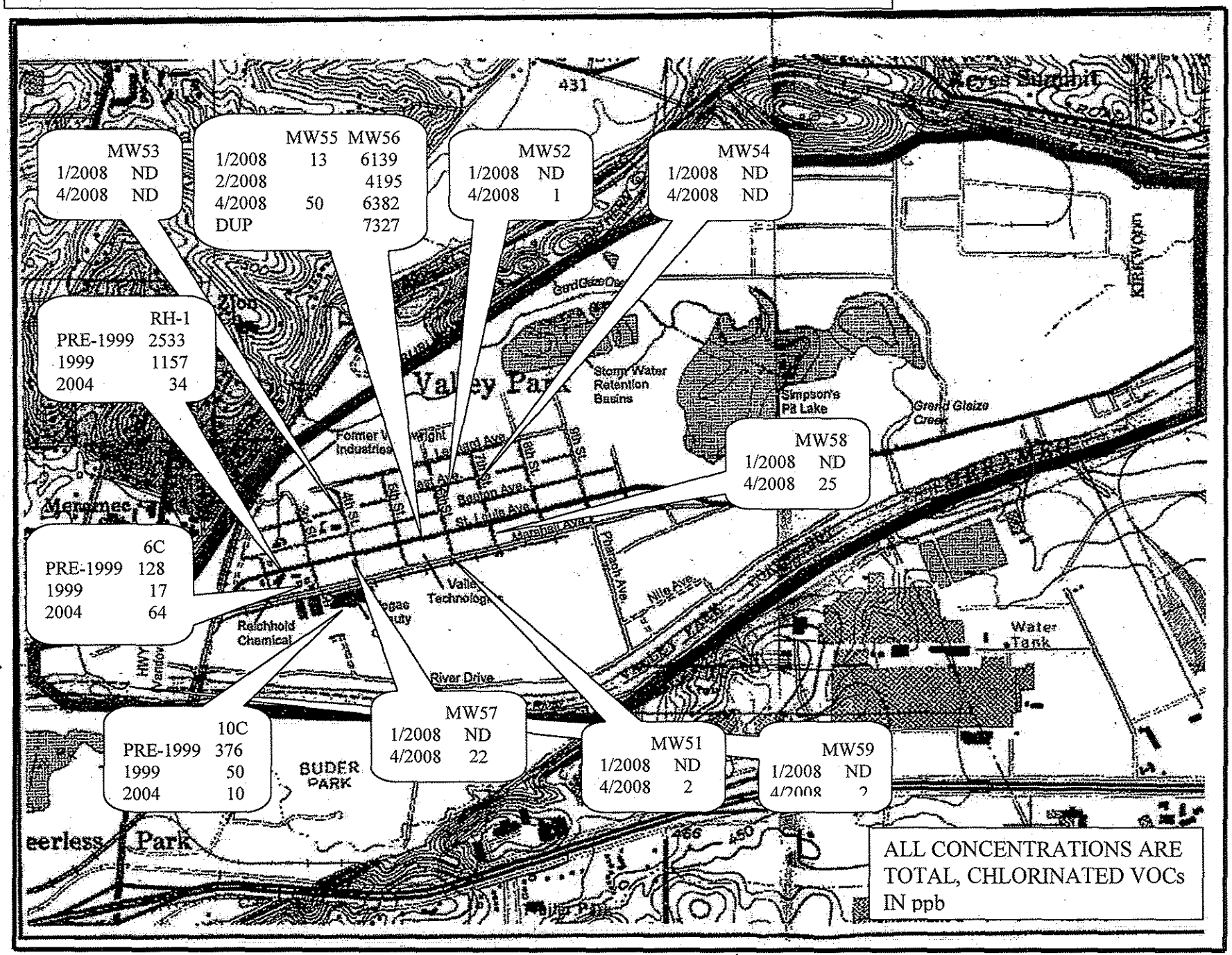
  The electronics control system has worked effectively in managing GETS and alerting the O&M contractor when shutdown incidents have occurred.

- Groundwater Monitoring System – The groundwater monitoring system includes nine monitoring wells located to track upgradient, sidegradient, and downgradient groundwater levels and contaminant concentrations (see Figure 8). The monitoring wells have worked without incident in two sampling events.

- Asphalt Cover – An asphalt cover was installed over the Valley Technologies' parking lot to support the SVE system by preventing short circuits in subsurface air flow patterns. The asphalt remains in excellent condition after two winter cycles. Maintenance of the cover is included in the O&M procedures.

- SVE System – A total of 5,000 cubic yards of contaminated soils were removed from three areas located on the Valley Technologies' property. Basically, the upper 18 feet of silty-clay soils were excavated and disposed off-site. Below 18 feet, the soils change to a permeable, sandy-gravel alluvial aquifer type. The one exception was the most contaminated area located next to the alley where soils were excavated to a depth of 24 feet due to the very high concentrations of contaminants and the fact that the silty-clay soils extended deeper in this area.

FIGURE 8. MAP OF MONITORING WELL LOCATIONS AND SAMPLING



Following the excavation work, a seven-well SVE system was installed to remove soil contamination in the alluvial aquifer zone located between 18 and typically 30 feet below ground surface. The ROD specified site-specific soil cleanup standards based upon a risk of contaminating the groundwater above drinking water standards. Upon startup, the SVE system was drawing minimal air flow when the design estimated flow rate was 180 cfm. Extensive testing was conducted to determine if there was a mechanical and/or installation error causing the problem; none were found.

In 2007, EPA retained the O&M subcontractor to conduct a study which involved testing the individual SVE wells for (1) air flow capacity; (2) implementing standard well development methods; and (3) if necessary, replacement of two SVE wells. The study was completed, and a report was submitted in May 2007. The following findings were reported:

- The measured permeabilities in the SVE wells were three to four orders of magnitude lower than assumed in the design calculations.

- Water was found in the SVE wells and required pumping prior to testing.

- Four different well development methods were utilized in an attempt to improve the permeabilities and corresponding air flows into the wells. The effort was unsuccessful.

- Replacing two SVE wells increased the air flow rate minimally. Maximum air flow rates in the new wells were only about 5 cfm.

EPA believes that the problem with the SVE system is due to the decision to use flowable fill to backfill the excavations. Flowable fill is a combination of sand and a weak concrete mix (see photo in Attachment B). Flowable fill was chosen for the backfill material for several reasons including winter time weather conditions, excellent results in other remedial actions by the design firm, and timely restoration of the parking lot for use by Valley Technologies. Based on these criteria, the use of flowable fill was a success. However, the concrete/bentonite slurry fraction appears to have seeped into the permeable, upper part of the vadose zone where the SVE wells are screened. The result is a significant loss of air permeability. In addition, EPA and the construction contractor noticed several examples of water pooled within the flowable fill and adjacent soils. This observation correlates with the study's finding that water was standing in the SVE wells even though the SVE wells are screened above the groundwater table. Again, the flowable fill appears to have increased the moisture content of the vadose zone which would result in a loss of air permeability.

The O&F work has identified that the existing SVE system is not working as designed, and the use of the flowable fill has significantly reduced the effectiveness of the SVE technology at OU2. It is this issue which has extended the O&F period beyond the typical one-year time frame.

The sole purpose for the SVE system was to remove contaminants in soils located above the groundwater table in the source area which would migrate into and contaminate the groundwater above drinking water standards. The question becomes what can be done in place of the SVE system? Relative to available Site data upon which the ROD was based, the design included the first detailed soil sampling event and found the most contaminated areas. As a result, the excavation work was far more effective in removing soil contamination than expected during the ROD. In other words, the remedy included SVE because the extent and locations of any soil source areas were unknown in the RI/FS and ROD. SVE may not have been required as part of the remedy had there been confidence that the excavation work would have been effective in removing the contaminated source soils.

The following is a discussion of the effectiveness of the excavation. To understand the ensuing discussion, one must first understand which soil cleanup criteria apply. Soil cleanup standards were specified in the OU2 ROD to achieve the objective of protecting the groundwater. Table 5 presents a comparison of the OU2 ROD soil standards to similar standards for WOU and for an EPA Region 6 risk-based reference. The standards for OU2 and WOU are based upon site-specific calculation methods. The WOU ROD only presented the values for two contaminants as examples, but the calculation method can be used to produce values for all contaminants. This is also true for the OU2 contaminants which do not have a value presented in Table 5. Clearly, OU2 standards are lower and more conservative than WOU standards as shown in Table 5, yet both properties have the same type of contaminants and same geological setting. The purpose for presenting EPA Region 6 values is that most values are very similar between OU2 standards and EPA Region 6 values with one exception: 1,1,1-TCA is a Site contaminant at OU2; the values for the two references are very different. EPA Region 6 methodology has been peer reviewed on a national level and should be considered accurate. In addition, EPA Region 6 values are available for several contaminants. As a result, EPA Region 6 values will be utilized for the following analysis of the effectiveness of the excavation work.

TABLE 5. COMPARISON OF SOIL CLEANUP CRITERIA

CONTAMINANTS	SOIL CRITERIA (ppb, µg/kg)		
	2001 OU2 ROD	REGION 6 DAF = 20	1994 OU1 ROD
1,1-DICHLOROETHANE	*	20,000	*
1,2-DICHLOROETHANE	-	20	-
1,1-DICHLOROEHENE	22	60	-
CIS-1,2-DICHLOROETHENE	510	400	-
TRANS-1,2-DICHLOROETHENE	-	600	-
PERCHLOROETHENE	-	60	737
1,1,1-TRICHLOROETHANE	80	2,000	-
1,1,2-TRICHLOROETHANE	49	18	-
TRICHLOROETHENE	66	60	255
VINYL CHLORIDE	16	14	-

* Values not presented in the ROD, but the calculation method was defined in the RI/FS.

Figures 9 and 10 present the soil sampling results before and after the excavation work, respectively. Comparing the two figures clearly shows that the soil excavation was highly effective. For example, the most contaminated location adjacent to the alley was reduced 97 percent in concentration. Essentially, the condition of the soils following excavation is that (1) widespread, low levels (below 250 ppb VOCs) of contamination exist over a large area of the Valley Technologies' parking lot; and (2) the two release/source areas have been found with the one beside the building effectively removed and the one beside the alley significantly reduced in contaminant mass. Although significantly reduced, the contamination levels in the alley source area are still at high levels (up to 38,000 ppb TCE).

In conclusion, the Agencies find that the soil excavation work was very effective for OU2 soil source areas, but additional work is required in the alley source area to achieve the ten-year remediation goal.

FIGURE 9. MAP OF SOIL CONCENTRATIONS BEFORE THE EXCAVATION AT OU2

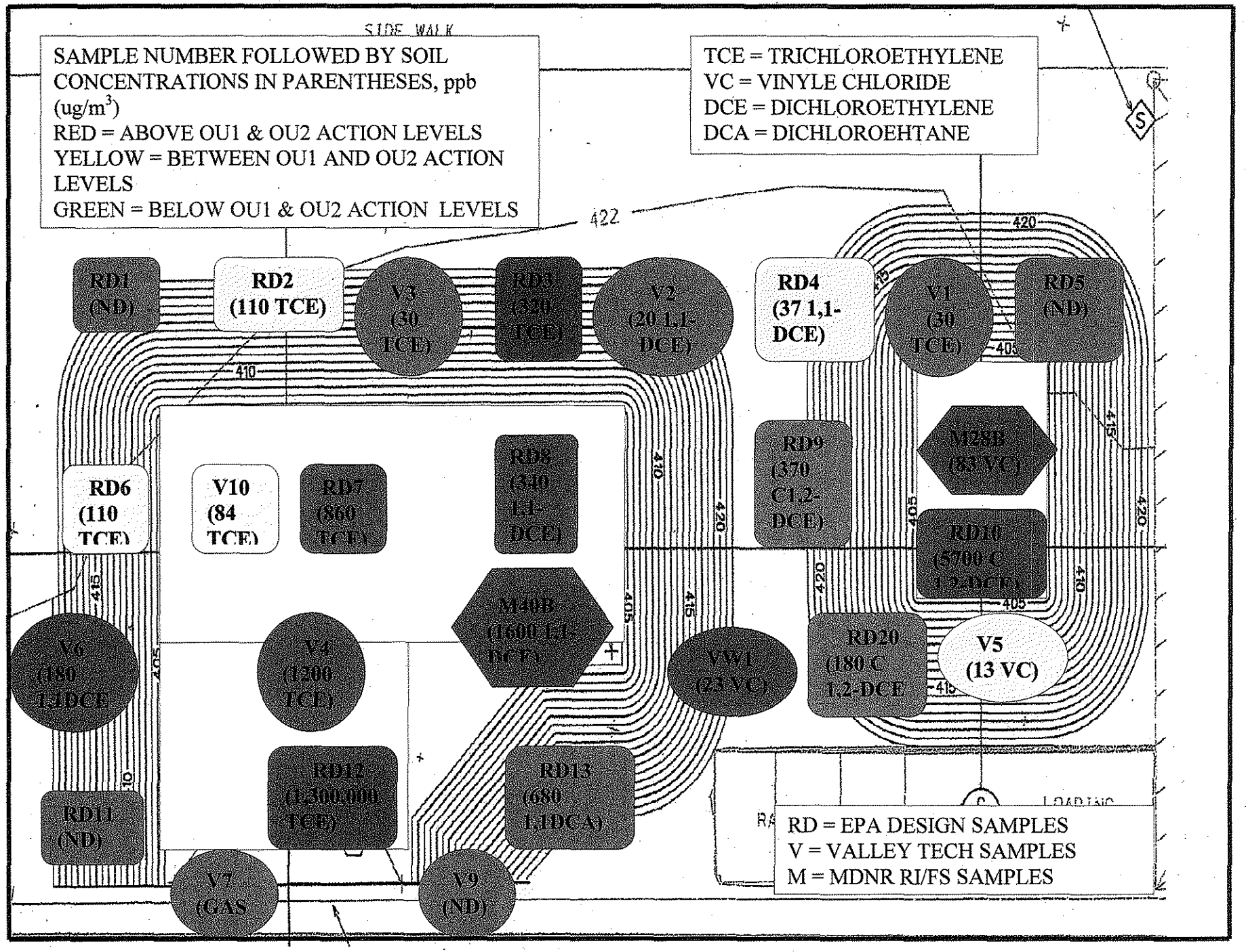
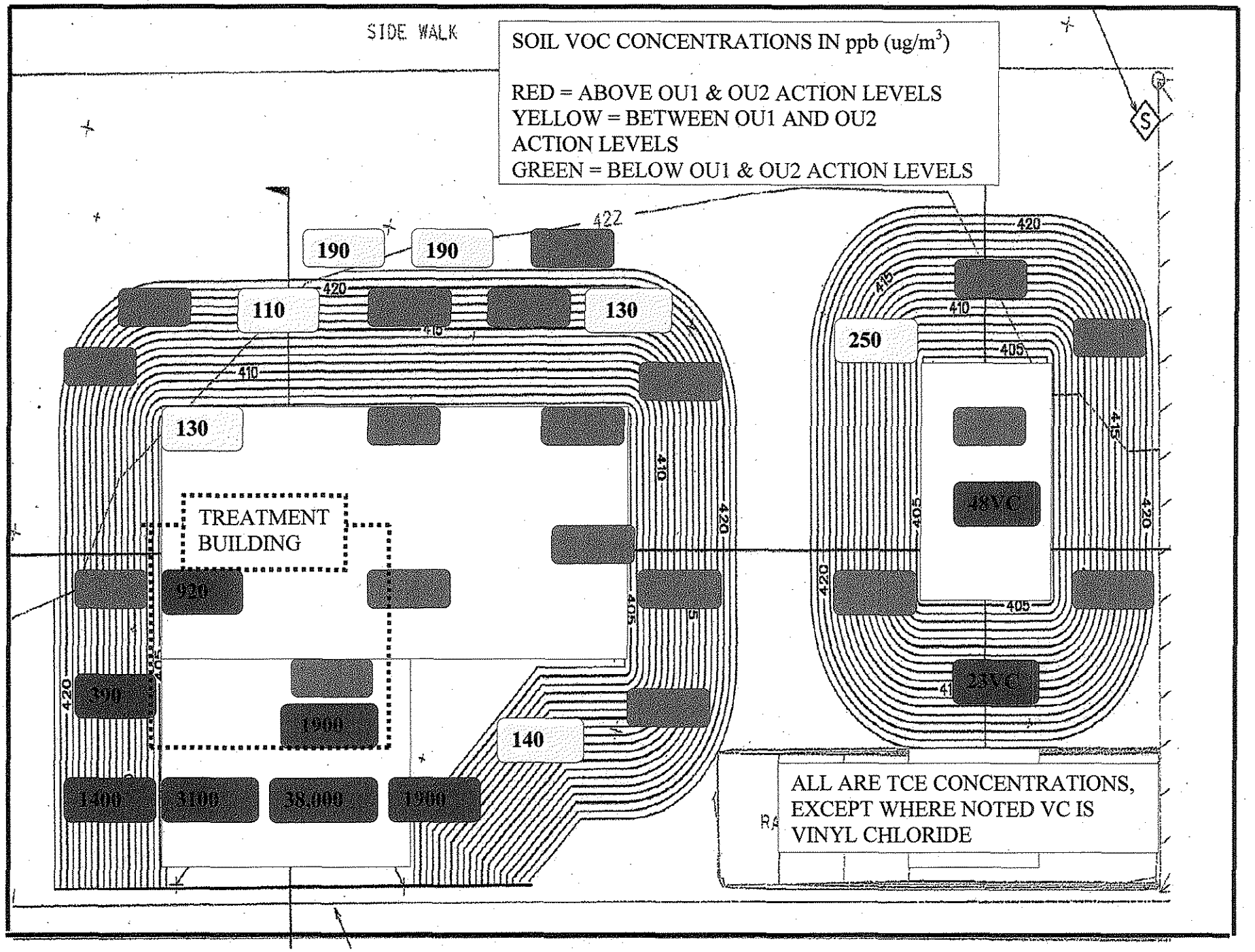


FIGURE 10. MAP OF SOIL CONCENTRATIONS AFTER THE EXCAVATION FOR OU2



6. FIVE-YEAR REVIEW PROCESS

Administrative Components

Valley Technologies and Wainwright were notified of the initiation of the FYR at the same time as the public with issuance of the public notice on May 11, 2008. The FYR was conducted by Steve Auchterlonie of EPA and Wane Roberts of the Department, remedial project managers for the Site. A legal and technical review team was assembled with expertise in risk assessment and Superfund law and procedures. During May and June 2008, the review included the following components:

- Community Involvement
- Document Review
- Data Review
- Site Inspection
- Local Interviews
- FYR Report Development and Review

The review schedule provides for approval of the second FYR by the scheduled date of September 2008.

Community Involvement

A public notice announcing the start of the second FYR review was published in the Sunday, May 11, 2008, edition of the *Press-Journal* Newspaper. The *Press-Journal* serves the Valley Park area. In addition, a fact sheet was developed for the Site. Both are included in Attachment C.

Upon finalization of this second FYR, a notice announcing completion of the second FYR will be placed in the *Press-Journal* Newspaper. The notice will provide information similar to the initial notice and will add information on the location of the FYR for public viewing, i.e., the Information Repository.

During the design and construction phases of OU2, the Agencies met with city officials on several occasions to keep them abreast of the project schedule and technical details. Before construction began, EPA developed fact sheets explaining the work schedule and distributed the fact sheets to residences and businesses within one block of the Valley Technologies' property.

Document Review

This second FYR consisted of a review of relevant documents including the early decision documents, baseline risk assessments, RI/FS reports, RODs, ESDs, legal documents, O&M records and reports, and monitoring data. These documents provided information necessary to

develop and prepare the second FYR. A listing of documents used during this FYR is provided in Appendix A.

Cleanup levels and Applicable or Relevant and Appropriate Requirements (ARARs) were reviewed. The intent of the review is to evaluate whether the selected remedy remains protective of human health and the environment. EPA did not identify new ARARs which required changes to the remedy.

Data Review

WOU

As required by legal and technical documents, i.e., Consent Decree, O&M Plan, Wainwright is required to submit quarterly status reports which summarize operational and monitoring data collected during the quarter. The Department reviewed the quarterly reports to track contaminant trends for compliance with the soil and groundwater performance standards, to assess progress in attaining the ten-year remedial goal, and to determine if there were any issues that would call into question the protectiveness of the remedy. Observations from these reviews are summarized below:

In situ SVE (soil remedy)

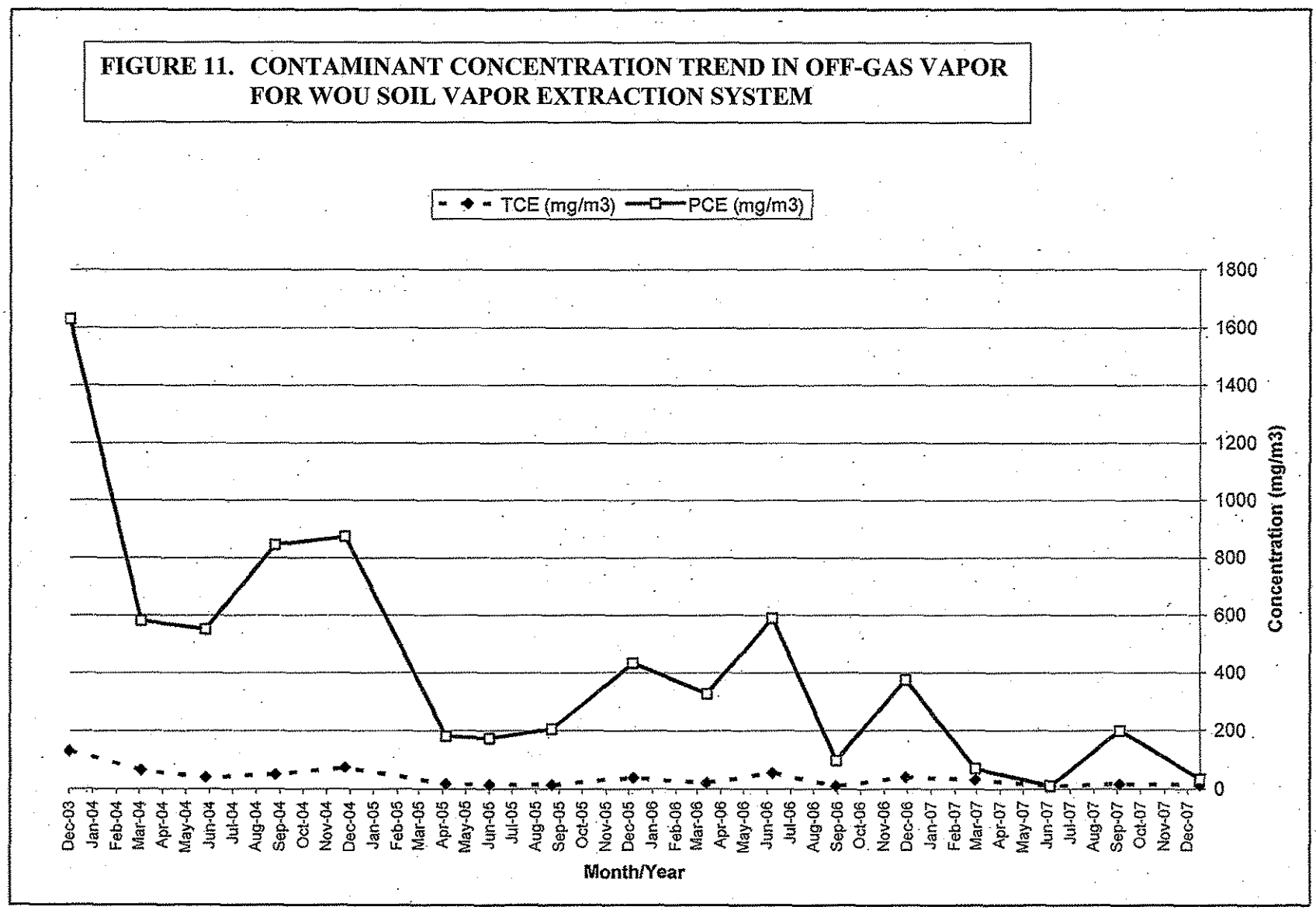
- On the basis of the average SVE concentrations, the Department estimates that 2,427 pounds of PCE and 243 pounds of TCE have been removed from the soil source beneath WOU (Figure 7).

- SVE vacuum pressures have historically operated at lower values than expected due to excess water (moisture) in the vacuum lines/wells.

- PCE and TCE concentrations measured in the SVE influent stream have shown a variable but steadily decreasing trend in the last five years ranging from 1,500 milligrams per meter cubed (mg/m^3) to 19.84 mg/m^3 for PCE and from 130 mg/m^3 to 12.78 mg/m^3 for TCE (see Figure 11).

- A significant quantity of PCE and TCE has been recovered over the last five years, but the rate of removal has decreased to a point where the trend is exhibiting asymptotic behavior. This behavior may be attributed to but not limited to the following factors (and possible combination): (1) low desorption rates of contaminants in soil due to

FIGURE 11. CONTAMINANT CONCENTRATION TREND IN OFF-GAS VAPOR FOR WOU SOIL VAPOR EXTRACTION SYSTEM



diffusion-controlled removal of contaminants within low permeability zones, (2) SVE extraction wells that are not properly located or screened to treat all contaminated areas, (3) an insufficient number of SVE wells, and (4) the presence of an unaddressed source of contaminants preventing cleanup using SVE within the remedial goal.

GETS (groundwater remedy)

- Extraction well RW-1 pumping rate has decreased below the 100 gpm design rate required to meet the ten-year remediation goal. The reason for this decrease is currently under investigation, but the Department believes that well screen plugging is the primary cause. Response actions are currently under investigation.

- Figure 5 presents contaminant concentration trends in the extraction well for the last five years of sampling results. Overall, contaminant concentrations for the primary chemicals of concern have shown some variability but have been on a general downward trend. Total VOCs (the sum of all primary chemicals monitored) decreased from a high of 2,130 micrograms per liter (µg/L) in August 2003 to a low of 179 µg/L in December 2006. Beginning in December 2006, total VOC concentrations have increased with a December 2007 level of 732 µg/L. As discussed previously, the Department suspects that the reduced pumping rate in the extraction well, fluctuations in groundwater levels, and a possible remaining soil source of contamination are responsible for these contaminant trends.

OU2

With the SVE system not operating, the O&F data produced were for the groundwater systems. The types of data included influent and effluent water samples to the treatment system, groundwater samples from the monitoring wells, groundwater elevations, and ambient air samples.

GETS Influent and Effluent

- Table 6 presents the contaminant concentrations in the influent stream to the treatment system. Data were not collected in 2007 which would have allowed trend analysis. The total VOC concentrations in 2008 are basically level at approximately 65 ppb. Two effluent samples have documented complete removal of contamination by the treatment system.

TABLE 6. OU2 GETS INFLUENT GROUNDWATER CONCENTRATIONS

CONTAMINANT	2006 SAMPLING EVENT (PPB)	JAN 2008 (PPB)	FEB 2008 (PPB)	APRIL 2008 (PPB)
1,1 DICHLOROETHANE	4	2	2	2
1,2 DICHLOROETHANE	ND	ND	ND	ND
1,1 DICHLOROETHENE	14	15	10	10
CIS-1,2 DICHLOROETHENE	5	12	12	14
TRANS-1,2 DICHLOROETHENE	ND	ND	ND	ND
PERCHLOROETHENE	2	8	8	6
1,1,1 TRICHLOROETHANE	2	4	4	3
TRICHLOROETHENE	22	27	26	29
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL	49	68	62	64

Groundwater Monitoring

- Figures 8 and 12 present a summary of data for the nine wells installed during the OU2 construction (wells MW51 through MW59); four wells installed as part of the RI/FS process (6C, 10C, 14C, and the Reichhold production well RH-1); two historic wells on the Valley Technologies' property which no longer exist (41S and 41D); and the closest Kirkwood water supply well.

- Contaminant concentrations in the Reichhold well and the two nearby wells (6C and 10C) have decreased significantly from 1999 to 2004 which document hydraulic control at WOU. Well 14C and the Kirkwood municipal well document that the plume has not migrated to the east.

- Contaminant concentrations in the OU2 monitoring wells located outside the OU2 source property (MW51 through MW59) were all clean in the January 2008 sampling event. However, concentrations in five of these wells increased in the April 2008 sampling event. The spring weather in the Valley Park area was exceptionally wet such that the Meramec River was at record levels (although the new levee prevented flooding of the city). The groundwater elevations were definitely high, and the city asked all businesses including EPA to shut down their extraction wells. Thus, the data for the April sampling event are not considered representative of normal conditions. The January 2008 data indicate site-wide hydraulic control of both WOU and OU2 source areas.

- Figure 12 presents the groundwater data for the monitoring wells located on OU2 source area (MW55 and MW56). In addition, data for three historic wells are presented for comparison purposes. Contaminant concentrations in MW55 are much lower than in MW56. Again, the April 2008 concentrations are higher than the January 2008 concentrations due to the high water conditions. The contaminant concentrations in MW56 are in the 6,000 ppb range, and this level is higher than expected. In comparison, the historic wells and corresponding data averaged 2,000 ppb total for VOCs. The soil excavation data do not indicate a soil source in that section of OU2 which would create the contamination level found in MW56. Thus, one of two explanations is possible: (1) the original plume migrated east and below the Valley Technologies' building, or (2) there is a soil source area below the Valley Technologies' building which was not found previously.

Groundwater Elevations

- Only one set of groundwater elevation data has been taken at this time. The first data set was obtained in January 2008 and nothing since due to the high water/flood conditions. The January data indicated that the area-wide flow direction was from the southwest to the northeast, away from the Meramec River. Once flood conditions recess, monthly data will be collected to track the hydraulic control of the OU2 source area.

Ambient Air Concentrations

- Figure 13 presents the six sampling locations which have been sampled twice since January 2008. No Site contamination has been detected. Certain phenolic compounds have been detected which are suspected to originate from the Reichhold facility.

Site Inspection

WOU

An abbreviated site inspection for WOU was completed on April 24, 2008. The site inspection was combined with the scheduled annual performance monitoring. The inspection included the GETS and SVE system and a general inspection of the Site. Overall, the Site was found to be in generally good condition. Mechanical systems appeared to be operating properly with the exception of the GETS extraction well at reduced flow as discussed previously in this report. The Department observed the SVE system vent lines were operating at reduced line pressures. Site personnel responded that recent high groundwater levels were causing excessive water buildup in vent lines. The Site's checklist is included in Attachment D

FIGURE 12. MAP OF GROUNDWATER CONTAMINANT CONCENTRATIONS ON

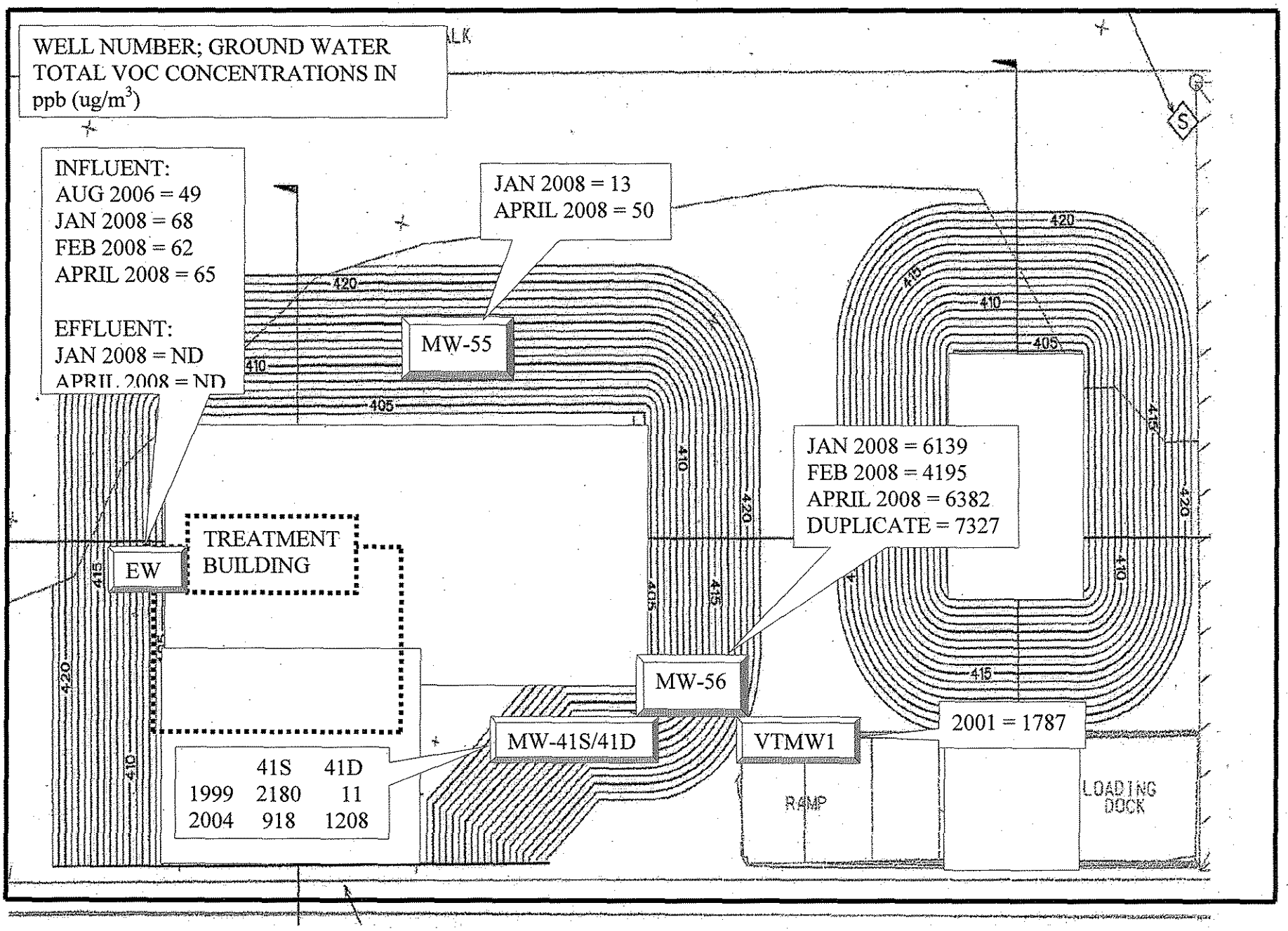
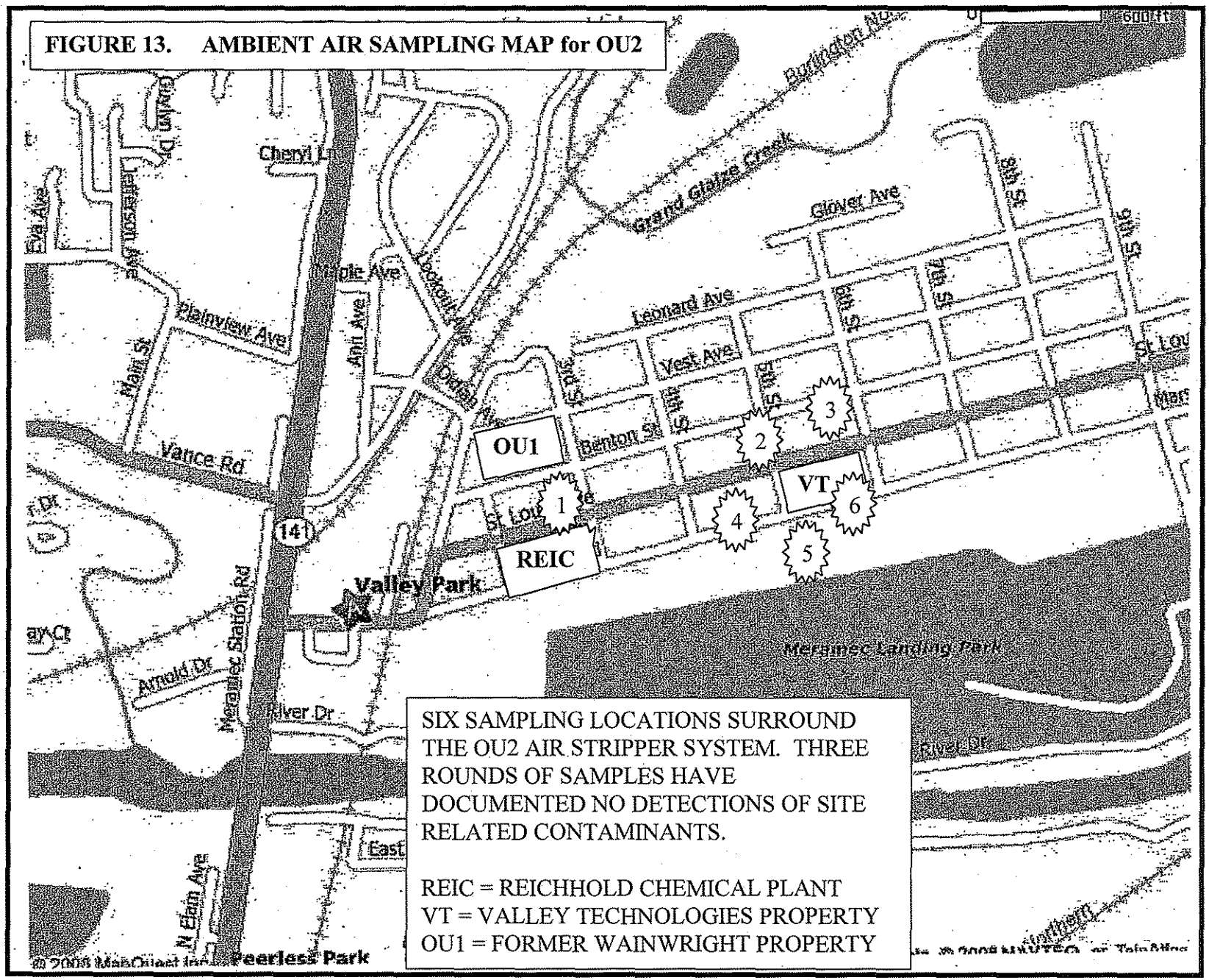


FIGURE 13. AMBIENT AIR SAMPLING MAP for OU2



SIX SAMPLING LOCATIONS SURROUND THE OU2 AIR STRIPPER SYSTEM. THREE ROUNDS OF SAMPLES HAVE DOCUMENTED NO DETECTIONS OF SITE RELATED CONTAMINANTS.

REIC = REICHHOLD CHEMICAL PLANT
VT = VALLEY TECHNOLOGIES PROPERTY
OU1 = FORMER WAINWRIGHT PROPERTY

OU2

Due to the EPA-funded design, construction, and O&F activities, OU2 inspections regularly occurred over a ten-month period during the construction phase by the Agencies. Construction photographs are presented in Attachment B. The Department will visit OU2 on a monthly basis for sample collection, and EPA's O&M contractor will visit OU2 at least weekly to monitor the operation of GETS. In addition, a software system was installed which allows the O&M contractor to check the system's status at anytime via computer.

Site Interviews

Site interviews specifically for the FYR were unnecessary because meetings and conversations have taken place routinely over the past five years between representatives of the Agencies, Wainwright, Valley Technologies, city officials, city business owners, and residents.

7. TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

WOU

REMEDIAL ACTION PERFORMANCE

A review of the available performance data and operating conditions for the soil and groundwater remediation systems found that the groundwater and SVE systems are not operating as intended by the remedy. The groundwater remedy is operating at reduced hydraulic control, and the soil remedy is operating at a low contaminant recovery rate. The overall remedial action goals are expected to be achieved; however, the intended time frame of ten years may not be met.

SYSTEM OPERATIONS/OPERATION & MAINTENANCE

While the system has operated on a continuous basis over the last five years, the effectiveness of the groundwater system to provide for continuous hydraulic control has not been maintained. The SVE soil remedy has successfully recovered a substantial amount of contamination; however, recent trend data have shown a low mass removal rate and asymptotic behavior that would prolong the time of cleanup. A reassessment of the SVE system is required to determine if it needs to be expanded or improved.

Annual O&M costs as presented in Table 1 have been within the estimate of the ROD. However, total O&M costs will exceed the ROD's estimate because the ten-year cleanup time frame will not be achieved.

OPPORTUNITIES FOR OPTIMIZATION

Opportunities for optimization are currently being reviewed and implemented. As an example, supplemental performance monitoring was conducted in 2006 to determine the contamination extent and concentrations in soil, soil gas, and SVE vent gas/vapor. Preliminary results indicate the potential that the SVE system may not be addressing the full extent of contamination in the soil source.

Additional investigation of the SVE system is needed to fully evaluate the effectiveness and to achieve the performance standards within the time frame specified in the ROD. The investigation will assess the capture efficiency of the SVE system. The goal of the assessment is to determine whether the SVE system should be expanded. If necessary, alternative treatment technologies should also be explored and evaluated.

EARLY INDICATORS OF POTENTIAL ISSUES

As discussed previously in this report, the groundwater extraction system is operating at a lower pumping rate than originally approved. As a result, hydraulic control of the groundwater beneath WOU has not been maintained. For the SVE system, an assessment is needed to determine if it should be expanded. Current removal rates are low, and groundwater concentrations remain high.

IMPLEMENTATION OF INSTITUTIONAL CONTROLS AND OTHER MEASURES

As noted in Section 5 of this report, a deed restriction placed on the property by the current property owner has been completed. The IC prohibits the installation and operation of groundwater supply wells. However, the Agencies will work to place a restrictive covenant on the WOU property.

OU2

REMEDIAL ACTION PERFORMANCE

The review of documents, ARARs, risk assumptions, and the results of the site inspections indicated: (1) the groundwater remedial system is functioning as intended, and (2) the SVE system is not functioning as intended by the ROD as modified by the ESD. The intent of the ROD and design was to achieve drinking water standards in the area-wide plume within ten years from startup. This goal is expected to be achieved throughout OU2 except the source area—Valley Technologies' property—without the subsurface soil contaminants removed to achieve soil cleanup standards.

Groundwater chemical monitoring data collected before the flood conditions indicated that GETS was hydraulically controlling OU2 source area. Ambient air monitoring data validated the air modeling design work to achieve safe dispersion of the air stripper emissions. In addition,

GETS effluent chemical data document complete removal of the Site's contaminants from the influent stream and prior to discharge to the storm sewer system.

The soil excavation component of the remedy was highly effective in identifying the two soil sources on the Valley Technologies' property, eliminating the one closer to the building and removing at least 97 percent of the contaminant mass in the source next to the alley. However, contamination levels in the alley source area and 24 feet below the surface remain at high concentrations, and the SVE system is not functioning to remove those contaminants.

Cleanup levels for OU2 are defined as the achievement of drinking water standards in the source area and the area-wide groundwater.

SYSTEM OPERATIONS/OPERATION & MAINTENANCE

Implemented operating procedures maintained the effectiveness of GETS. EPA retained a contractor to implement the long-term remedial action work. In addition, the Department will conduct the necessary chemical monitoring for the treatment systems pursuant to a Cooperative Agreement with EPA.

The current O&M annual cost as presented in Table 2 is 50 percent higher than the ROD's estimate. The main component for the higher cost is reporting requirements which were not considered in the ROD's estimate.

OPPORTUNITIES FOR OPTIMIZATION

The focus at OU2 thus far has been achieving completion of the O&F period. Optimization opportunities have not been considered up to this point in the remediation.

EARLY INDICATORS OF POTENTIAL ISSUES

As discussed previously in this report, an alternate method must be identified and implemented in the soil source area next to the alley to achieve the ten-year cleanup goal due to the problem encountered with the SVE system.

The groundwater contamination levels found in MW56 are higher than anticipated. If this contamination level does not decrease within the next two years, an investigation may be required to determine the source.

IMPLEMENTATION OF INSTITUTIONAL CONTROLS AND OTHER MEASURES

Two ICs were required in the ROD for OU2: (1) an IC placed on the Valley Technologies' property by the owner, and (2) an IC placed throughout the Site by the city to prohibit the installation and operation of groundwater wells until the aquifer is remediated. These ICs were

determined necessary in the ROD because of the widespread contamination in the aquifer and the influence on contaminant migration demonstrated by existing industrial wells.

The Department drafted a restrictive covenant as the IC for the Valley Technologies' property and sent it to the property owner. The expectation is that this IC will be in place during 2008.

The Agencies do not believe the area-wide IC is required at the Site because the combined pumping of the WOU GETS, the Reichhold production well, and the OU2 GETS has significantly decreased groundwater contamination levels in monitoring wells located around the Site (refer to Figure 8). For example, the Reichhold production well is located less than two blocks from the WOU extraction well, and the contamination level in the Reichhold well has decreased 97 percent since the WOU system was started. Also, prior to flood conditions, all peripheral OU2 monitoring wells were not contaminated which is a significant change compared to data used to develop the ROD.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives established at the time of remedy selection still valid?

CHANGES IN STANDARDS AND TO BE CONSIDERED (TBC)

WOU

Chemical-specific ARARs were identified in the ROD. The cleanup standards for WOU were identified in the ROD as modified by the ESD.

- Groundwater (OU3) – cleanup standards were defined to be drinking water MCLs. These standards have not changed.

- MTBE has been detected in groundwater beneath WOU. While no MCL has been established for MTBE, discharge of this contaminant as a result of groundwater treatment is permitted under the Department's Water Pollution Control Program (WPCP) regulations. Pursuant to the WPCP regulation, MTBE contamination would require treatment to within the discharge limits set by the operating permit issued by the Department's WPCP on the basis of discharge through Valley Park's municipal storm sewer system with outfall to the Meramec River. Pursuant to the draft permit for the municipal water sewer system, currently out on public notice for comments, the final effluent limitations specify a maximum daily limit of 40 ppb and an average monthly limit of 20 ppb per the *Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Methyl tertiary-Butyl Ether (MtBE)* (EPA Advisory, 1997). The advisory sets limits on acceptable concentrations on the basis of human sensitivity to taste and odor for most people, recognizing that human sensitivity to taste and odor varies widely. It was further stated in the advisory that protection of the water source from potential taste and odor as recommended would also protect consumers from potential health effects.

- Air – The Federal Clean Air Act, the State Implementation Plan, and the Missouri Air Quality Standards establish air quality standards that apply to the air emissions released from SVE and GETS during remedial activities at WOU. Air emissions from SVE and GETS must comply with regulations adopted by the St. Louis County Health Agency, the Department's Air Pollution Control Program, and EPA. In addition, the ROD specified that ambient air emissions must achieve risk-based levels.

- Soils – For WOU, direct contact to surface soils and migration from soil to groundwater are unacceptable threats posed by contaminated soils. As a result, the soil performance standards are based on these two threats. The methods used to develop the soil performance standards are described in Chapter 2 of the *Final Feasibility Report for the Wainwright Operable Unit* (May 9, 1994). All surface and subsurface soils must achieve the soil performance standards based on the threat to groundwater prior to completion of the remedial action.

  Action-specific ARARs specified in the ROD are still valid. The protectiveness of the remedy will be maintained provided ICs remain in place and the WOU contaminant plume is hydraulically controlled.

OU2

The cleanup standards for OU2 were identified in the ROD as modified by the ESD.

- Groundwater – cleanup standards were defined to be drinking water MCLs. These standards have not changed.

- Discharge to Storm Sewer – the treated water from the air stripper must meet MCLs prior to discharge into the storm sewer outlet.

- Air Discharge – air emissions from SVE and GETS must comply with regulations of the St. Louis County Department of Health, the Department's Air Pollution Control Program, and EPA. Ambient air emissions must achieve risk-based levels.

- Soils – a site-specific method was specified in the ROD to set cleanup standards for soils based upon the threat to contaminate groundwater. As presented earlier in this report, the standards calculated using the site-specific method produce values which are very similar to the EPA Region 6 reference method for most site contaminants. However, there is a significant discrepancy in the standard developed by the two methods for 1,1,1-TCA which is an OU2 contaminant of concern. The Agencies believe that the EPA Region 6 reference is equally protective, and it has been rigorously peer reviewed.

WOU AND OU2

EPA Region 7 has a group of risk assessors who are available to provide risk assessment expertise including reviewing site information during FYRs. At the Superfund Program's request, an EPA risk assessor conducted just such a review; that review provided the following analysis concerning *Changes in Standards and TBCs*:

Have there been changes to risk-based cleanup levels or standards identified as Applicable or Relevant and Appropriate Requirements (ARARs) in the ROD that call into question the protectiveness of the remedy?

EPA is not aware of changes in ARARs which would affect the protectiveness of the remedy.

Are there newly promulgated standards that call into question the protectiveness of the remedy?

EPA is not aware of any newly promulgated standards that call into question the protectiveness of the remedy.

Have TBCs used in selecting cleanup levels at the site changed in a way that could affect the protectiveness of the remedy?

EPA is not aware of changes to any TBCs used in selecting the cleanup levels that could affect the protectiveness of the remedy.

CHANGES IN EXPOSURE PATHWAYS

WOU

The exposure assumptions used to develop the baseline risk assessment in 1994 included potential exposures to (1) an adult on-site worker, (2) an adolescent visiting WOU, (3) an adult off-site resident, (4) a child off-site resident, (5) an adult living on WOU, and (6) a child living on WOU. While there are no changes in WOU Site conditions that create new exposure pathways, one significant land use change is the potential for development of the area due to the completion of the flood levee.

OU2

The RI and ROD identified potential occupational, trespasser, and residential exposure scenarios. No changes to these scenarios are required. Since the ROD, the one significant land use change is the potential for development of the area due to the completion of the flood levee.

WOU AND OU2

The EPA risk assessor provided the following analysis concerning *Changes in Exposure Pathways*:

Has land use or expected land use on or near the site changed?

EPA is not aware of any land use changes at the Site.

Have any human health or ecological routes of exposure or receptors changed or been newly identified (e.g., dermal contact where none previously existed, new populations or species identified on site or near the site) that could affect the protectiveness of the remedy?

EPA is not aware of any routes of exposure or receptors which have changed, but two routes of exposure do appear to require further investigation:

1. The vapor intrusion pathway does not appear to have been evaluated at either of the OUs. Previous sampling efforts have identified elevated concentrations of VOCs in groundwater beneath the OUs. EPA has identified groundwater screening levels to aid in the evaluation of a vapor intrusion potential. Contaminant concentrations above these screening levels indicate the potential for a vapor intrusion concern to be present. Table 7 compares WOU concentrations of PCE and TCE—the primary VOCs at the Site as identified in Table 19 of the 1994 Final RI report—with the VOC screening levels used by EPA to identify the potential for vapor intrusion. Table 7 also compares PCE and TCE concentrations presented in Figure 3 with the VOC screening levels used by EPA:

Table 7. WOU Vapor Intrusion Analysis

Contaminant	Concentration in 1994 RI report, µg/l	Concentration Figure 3, µg/l *	EPA screening Level, µg/l
PCE	1,500	220	5
TCE	420	480	5

* approximate concentration

Table 8 makes a similar comparison for groundwater at OU2 based on concentrations of PCE and TCE identified in Tables 4-1 and 4-3 of the 2001 RI report (E&E, 2001):

Table 8. OU2 Vapor Intrusion Analysis

Contaminant	Concentration in 2001 RI report, µg/l	EPA Screening Level, µg/l
PCE	1,270	5
TCE	1,750	5

A comparison of the groundwater concentrations identified at the Site to the screening values in EPA's vapor intrusion guidance shows that subsurface contamination at the Site may be present at levels high enough to indicate the potential for a vapor intrusion exposure pathway to exist. Subslab vapor sampling should be conducted in any nearby structures—commercial or residential—which might be impacted by site-related contamination to determine whether or not a potential vapor intrusion exposure pathway exists.

2. The use of contaminated groundwater in the production well at Reichold Chemical may create the potential for VOCs to be released into interior air at the facility. If this is the case, ambient air sampling should be conducted to verify that workers inside the facility are not being exposed to VOCs being released from the contaminated groundwater into the air.

Are there newly identified contaminants or contaminant sources?

EPA is not aware of any newly identified contaminants or contaminant sources. However, several issues were identified to be a concern relevant to the identification of contaminants or contaminant sources at the Site:

1. Wainwright manufactured metal stampings and operated as a contract tool and die shop (Schrieber, 1994). Valley Technologies was a metal parts manufacturing facility (E&E, 2001). Yet the Site's documents indicate that the presence of metals contamination at the Site may have been only marginally considered. Limited sampling for metals in soil was apparently undertaken at WOU with no significantly elevated concentrations identified. However, it appears that the sampling was done only at depth and after the most highly contaminated soil had been removed (Schreiber, 1994). At OU2, it appears that little to no soil sampling may have been done for metals (E&E, 2001). Some analysis has been done for metals in groundwater; however, data contained in the WOU RI report, Table 18, show that concentrations of six metals in the groundwater are above SDWA levels (EPA, 2006b). Most of these elevated concentrations were found in a downgradient well—MW17. The metals concentrations, sampling location, and SDWA levels are shown in Table 9.

Table 9. Metals Levels at WOU

Contaminant	Maximum concentration, µg/l	Location of maximum concentration	SDWA Level, µg/l
Aluminum	28,160	MW17	200 +
Cadmium	9	MWAA	5 *
Iron	44,770	MW17	300 +
Lead	53	MW17	15 #
Manganese	10,570	MW17	300 ++
Mercury	4.4	MW17	2 *

+ secondary drinking water standard
# drinking water action level
* MCL
++ lifetime health advisory

2. There seems to be some question as to whether all potential sources of contamination have been identified. Pages 1-4 of the OU2 RI report identified contaminant concentrations of TCE at 6,340 ppb and PCE at 386,000 ppb were found in soils underneath the WOU building (E&E, 2001). However, this contaminated soil was not completely excavated. Similarly, pages 4-8 of the OU2 RI report estimated that 7,500 cubic yards of contaminated soil exist at Valley Technologies and that, "This estimate does not include potential soil contamination beneath the Valley Technologies building." Figure 12 of the FYR report identifies high levels of total VOC concentrations in MW56 which may support the supposition that another source of contamination may exist on the Valley Technologies' property.

3. Also, there appears to be some confusion regarding the presence of PAHs at the Site. Table 15 of the WOU RI report shows the presence of several PAHs including benzo(a)pyrene (Schreiber, 1994), while page 29 of the WOU ROD calls benzo(a)pyrene a "key contaminant" and considers it to present both a groundwater and direct contact threat (EPA, 1994). Yet as documented in an ESD, the Agencies allowed this contamination as fill in the excavation area.

Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents (e.g., byproducts not evaluated at the time of remedy selection)?

EPA is not aware of any unanticipated byproducts of the remedy.

Have physical site conditions (e.g., changes in anticipated direction or rate of groundwater flow) or the understanding of these conditions (e.g., changes in anticipated direction or rate of groundwater flow) changed in a way that could affect the protectiveness of the remedy?

EPA is not aware of any changes in the Site's conditions or the understanding of those conditions which would affect the protectiveness of the remedy. EPA notes here, however, one potential issue associated with groundwater flow conditions as it relates to risk assessment:

1. Maps or figures were not available which defined both monitoring well locations and plume boundaries. Although the locations of the wells used in the city-wide groundwater monitoring are known, no detailed site-level descriptions of the monitoring well network or the extent of the contaminant plumes are available. Therefore, it was not possible to determine how far off-site the plumes have migrated and whether they may underlie any commercial or residential areas. From a risk assessment standpoint, such information is necessary to adequately evaluate whether there is a potential for concern regarding possible exposure pathways, especially the vapor intrusion pathway.

CHANGES IN TOXICITY AND OTHER CONTAMINANT CHARACTERISTICS

WOU and OU2

EPA's risk assessor provided the following analysis:

Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?

Some changes have been made since the initial ROD signature, but none of these changes resulted in any changes to the MCLs upon which the Site's remediation levels are based; none are expected to impact the protectiveness of the remedy.

Have other contaminant characteristics changed in a way that could affect protectiveness of the remedy?

EPA is not aware of any other changes to contaminant characteristics that could impact the protectiveness of the remedy.

CHANGES IN RISK ASSESSMENT METHODS

WOU and OU2

EPA's risk assessor provided the following analysis:

Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?

EPA has revised its dermal risk assessment guidance since the completion of the initial 1993 risk assessment. Region 7 also uses a different approach when estimating the health risks from inhalation of VOCs during household use of contaminated groundwater, i.e., bathing, showering, cooking, etc. Several exposure assessment input parameters in the 1993 risk assessment are slightly different than values currently used. These changes in methodology would not be expected to adversely affect the protectiveness of the remedies.

EPA has also developed and implemented a risk assessment guidance which evaluates the vapor intrusion pathway (EPA, 2002). Any future vapor intrusion investigations would need to follow this most recent guidance.

EPA has also developed guidance for assessing the impact of carcinogens which act by a mutagenic mode of action (EPA, 2005). The carcinogens covered by this guidance to date are primarily PAHs. If PAHs are determined to be contaminants of concern at the Site, any future risk assessment efforts would need to incorporate this new guidance.

EXPECTED PROGRESS TOWARD MEETING REMEDIAL ACTION OBJECTIVES

WOU

Prior to the last FYR, MTBE contamination complicated the implementation of the remedy technically which resulted in a delay of several years. However, the technical issues have been resolved; the treatment systems are operating.

The ROD defined one RAO:

1. Eliminate potential exposures to residents and/or employees of properties on WOU by actual or threatened release of hazardous substances in the soil, air, and groundwater through dermal, ingestion, and inhalation. ARARs will be used to define cleanup goals for groundwater. Cleanup goals for contaminated soils will be developed based on the threat to contaminating groundwater and from direct contact.

Performance data indicate a lower than expected contaminant removal rate using the SVE system and groundwater concentrations well above the MCL cleanup levels. Although the SVE system has removed a significant quantity of contamination, there is a possibility that the SVE system should be expanded.

For the groundwater remedy, a groundwater extraction well was installed to hydraulically control the source area contamination. The original design specified that a 100 gpm pumping rate was required to achieve cleanup goals within a ten-year time frame. As currently operated, the groundwater extraction well is at least 50 percent below the necessary and approved rate.

OU2

The ROD specified two RAOs:

1. Restore the contaminated aquifer for unrestricted use in Valley Park, and remove the risk of future contamination at Kirkwood wells by achieving safe drinking water standards.

2. Remediate contaminated soil sources identified at the Valley Technologies' property to eliminate their contribution to groundwater contamination.

A time frame of ten years was specified as the goal to achieve these RAOs. The results presented in this report document that the remedy is containing the source area groundwater contamination. However, groundwater contamination levels in the source area on Valley Technologies' property remain above cleanup goals. In addition, soil contamination levels were decreased by at least 97 percent. However, soil contamination levels remain above cleanup standards, and the SVE system is not functioning to remove this contamination.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

EPA's risk assessor provided the following analysis:

Have newly found ecological risks been found?

EPA is not aware of any newly identified ecological risks. However, the Superfund Program may want to consult with the Region 7 ecological risk assessors for verification.

Are there impacts from natural disasters (e.g., a 100-year flood)?

EPA is not aware of any natural disasters that have occurred on this Site.

Has any other information come to light which could affect the protectiveness of the remedy?

EPA is not aware of any other information which has come to light which could affect the protectiveness of the remedy.

Technical Assessment Summary

WOU

WOU ongoing remedial activities include an operating remedy, maintenance, and monitoring activities. These activities are subject to routine assessment, potential modifications, and/or actions. This report identifies required actions which will occur in the future.

For WOU, the remedy is not operating as defined by the ROD and modified by the ESD. Changes are required to the groundwater extraction system to restore well capacity, and an investigation is required to determine whether the soil remedy needs to be expanded. The low SVE removal rate and the high groundwater contamination levels indicate the potential that the current SVE and groundwater systems are not optimized to achieve the ten-year cleanup goal.

There have been no changes in the physical conditions of WOU that would affect the protectiveness of the remedy. Cleanup standards for air, groundwater, and soil remain protective. Changes in exposure assumptions and toxicity factors did occur and will be evaluated.

As implemented, the WOU remedy is considered protective to human health and the environment in the short term but will require continued evaluation to assure long-term protection.

OU2

According to the data reviewed and the Site's inspections, the OU2 groundwater remedy is functioning as intended by the ROD as modified by the ESD. Although the soil excavation removed the majority of the contaminant mass in the source area, contaminant levels in the soils below 18 feet from the surface remain at levels which will prevent achieving the ten-year cleanup goal. As noted elsewhere in this report, the SVE system installed to remove additional soil contamination has not operated as designed, warranting extension of the O&F period. As a result, alternative soil technologies will be investigated and implemented as appropriate.

There have been no changes in the physical conditions of OU2 that would affect the protectiveness of the remedy. Cleanup standards for air, groundwater, and soil remain protective. Changes in exposure assumptions and toxicity factors did occur but do not impact the protectiveness of the remedy.

As implemented, the OU2 remedy is considered protective to human health and the environment in the short term but may require modifications to assure long-term protectiveness.

WOU and OU2

The EPA risk assessor's analysis is summarized in the following recommendations:

1. An investigation is required to determine if vapor intrusion is occurring in properties adjacent to WOU and OU2 properties and in the Reichhold buildings.

2. A review of historic data at both WOU and OU2 is required to determine if metals contamination in soils and groundwater is adequately addressed.

3. A review of historic data at WOU is required to determine if PAH contamination in soils and groundwater is adequately addressed.

4. Groundwater plume maps are required as part of the O&M reporting for both WOU and OU2.

8. ISSUES

Issues	Operable Unit	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Loss of hydraulic control due to reduced pumping rate in GETS extraction well	WOU	N	Y
SVE removal rate is low	WOU	N	Y
Questionable if PAH contamination in soils and groundwater has been adequately addressed	WOU	N	Y
Determine if Restrictive Covenant is required instead of Deed Restriction	WOU	N	Y
Subsurface Soil Contamination Level exceeds Cleanup Standards, and SVE system not functioning	OU2	N	Y
High Contamination Levels in Monitoring Well 56	OU2	N	Y
Soil Cleanup Standard for 1,1,1-Trichloroethane is inconsistent between site-specific and EPA Region 6 methods	OU2	N	N
The well restriction institutional control must be recorded for the Valley Technologies' property and the site-wide IC eliminated as a requirement	OU2	N	N
Vapor Intrusion has not been investigated	Site	N (Until data show otherwise)	Y
Questionable if metals contamination has been adequately addressed	Site	N	Y
No Groundwater Plume Maps to show adequacy of well network	Site	N	Y

9. RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Operable Unit	Recommendations/Follow-Up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y / N)	
						Current	Future
Lack of Hydraulic Control	WOU	Restore pumping rate in GETS extraction well. Potential solutions include but not limited to well redevelopment using chemical and/or physical cleaning of well screen/filter pack or install new well.	Wainwright Industries, Inc.	DNR/EPA	September 2008	N	Y
Soil Source Assessment	WOU	Assessment of SVE effectiveness. Perform additional performance monitoring and reevaluate whether expansion of SVE system is required. Evaluate alternative treatment options as necessary.	Wainwright Industries, Inc.	DNR/EPA	September 2009	N	Y
PAHs	WOU	A review of historic data at WOU is required to determine if PAH contamination in soils and groundwater is adequately addressed.	DNR/EPA	DNR/EPA	September 2009	N	Y
Institutional Control	WOU	The Agencies will determine if a Restrictive Covenant is required to replace the existing Deed Restriction, evaluating any constraints posed by the current Consent Decree.	EPA/DNR	EPA/DNR	September 2009	N	Y
Evaluate SVE System	OU2	Investigate alternatives treatment methods to achieve soil performance standards and modify the remedy as needed to result in EPA and the state concurrently determining the remedy is O&F.	EPA	EPA/DNR	September 2010	N	Y
Contamination Levels in MW56	OU2	Investigate source of high levels of contamination in MW56 if the levels do not significantly decrease in 2008 and evaluate alternative treatment options as necessary.	EPA	EPA/DNR	September 2010	N	Y
Soil Performance Standard Method	OU2	Determine if EPA Region 6 soil standards should replace the site-specific method due to value for 1,1,1-TCA.	EPA	EPA/DNR	September 2009	N	N
Institutional Control	OU2	Remove the requirement for area-wide IC by a remedy modification. Complete and verify restrictive covenant placed on Valley Technologies' property.	EPA	DNR	September 2009	N	Y
Vapor Intrusion	Site	An investigation is required to determine if vapor intrusion is occurring in properties adjacent to WOU and OU2 properties and in the Reichhold buildings.	All Parties	DNR/EPA	September 2010	N	Y
Metals	Site	A review of historic data at both WOU and OU2 is required to determine if metals contamination in soils and groundwater are adequately addressed.	DNR/EPA	DNR/EPA	September 2009	N	Y
Plume Maps	Site	Groundwater plume maps are required as part of the O&M reporting for both WOU and OU2.	All Parties	DNR/EPA	Immediately	N	Y

10. PROTECTIVENESS STATEMENT(S)

The remedy currently protects human health and the environment because all documented threats at the Site have been addressed through excavation of shallow soils, placement of asphalt covers, ICs on the two source areas, and a clean water source used for the municipal water supply. However, in order for the remedy to be protective in the long term, the following actions must be taken: (1) complete an investigation to determine if site-wide vapor intrusion exists on properties adjacent to WOU and OU2 sources and the Reichhold buildings, (2) review historical data at both WOU and OU2 to determine if PAH and metals contamination in soils and groundwater has been adequately addressed, (3) assess the performance of the SVE system and GETS at WOU to determine if modifications to the current systems are required to achieve RAOs, and (4) evaluate the SVE system for OU2 to include alternative treatment methods to achieve soil standards.

Long-term protectiveness of the remedial action will be verified by obtaining O&M data required by the Consent Decree with Wainwright for WOU and by the Agencies for OU2. Current data indicate that contamination levels in the two source areas are decreasing but at low rates which jeopardize achieving the ten-year cleanup goals.

11. NEXT REVIEW

The next FYR for the Site is required by June 2013, five years from the date of this review.

Attachments

A. List of Documents Reviewed

The following documents were reviewed in completing the five-year review (FYR):

1994 Record of Decision (ROD) for the Wainwright Operable Unit (WOU), including all attachments

2001 ROD for Operable Unit 2 (OU2)

1996 Explanation of Significant Differences (ESD) to WOU ROD

2005 ESD to OU2 ROD

Consent Decree/Statement of Work (CD/SOW) for WOU

Remedial Action (RA) construction documents for WOU

RA design and construction documents for OU2

RA Operation and Maintenance (O&M) Plan for WOU

O&M Plan for OU2

WOU Quarterly O&M Status Reports

2003 FYR Report for Site

OU2 Preliminary Close Out Report

1999 WOU Work Plan for Soil Vapor Extraction (SVE) Pilot Test

2001 OU2 Remedial Investigation/Feasibility Study Reports

2007 OU2 SVE Work Plan and Summary Report for SVE Well Development

2008 Missouri Department of Natural Resources Chemical Analyses Reports: January, February, and April

Other guidance and regulations to determine if any new applicable or relevant and appropriate requirements (ARARs) relating to the protectiveness of the response actions that have been developed

Philip Industrial Services Group, response to comments on the report regarding the results of testing activities at WOU, Valley Park, Missouri, January 14, 2000

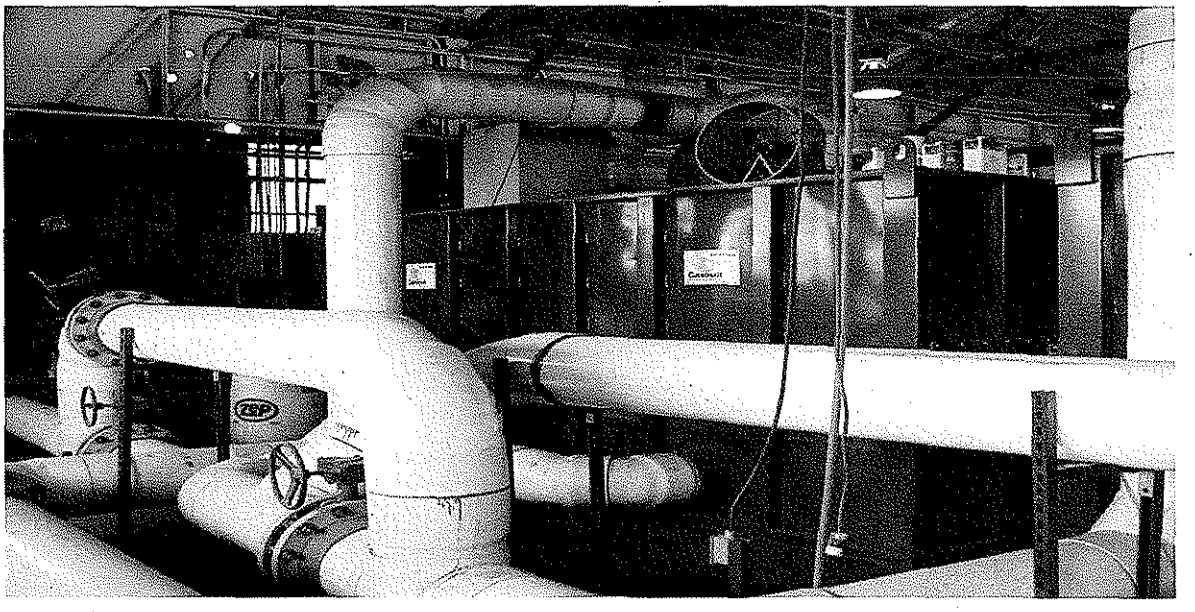
Remedial Investigation/Feasibility Study for WOU, Schreiber, 1994

Attachment B

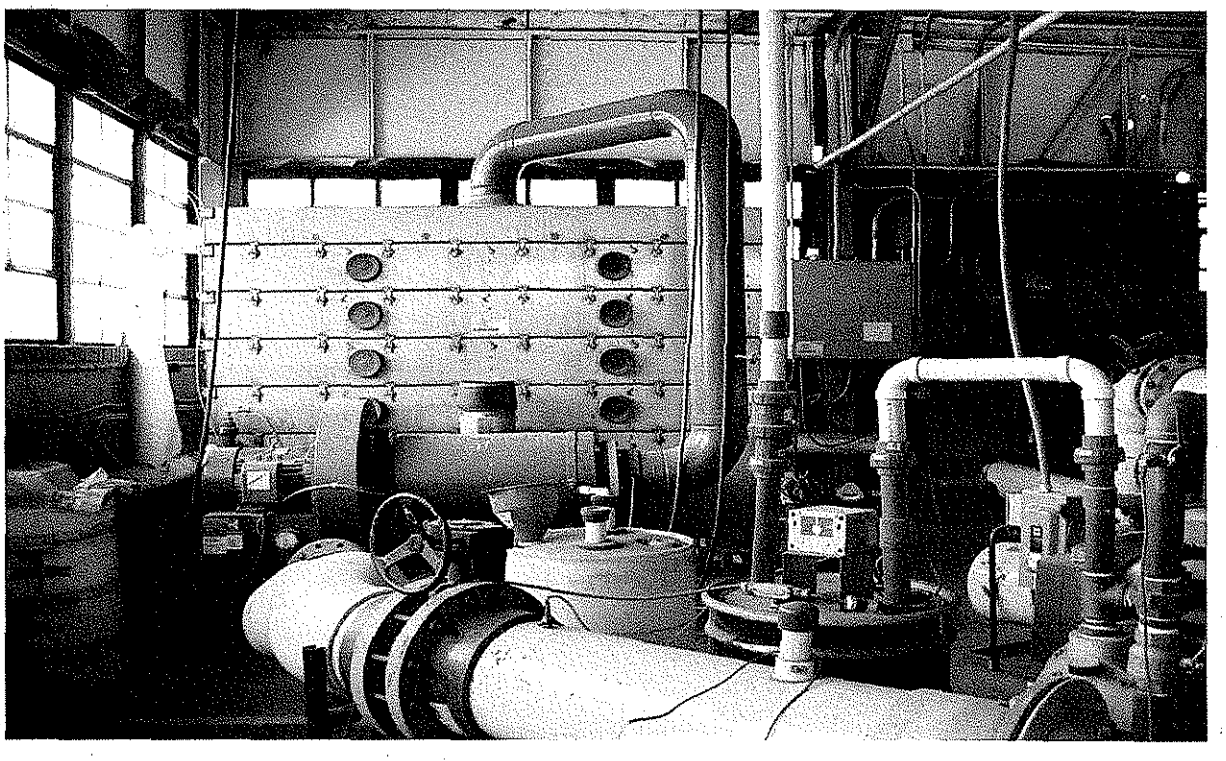
SITE PHOTOS

Wainwright Operable Unit:

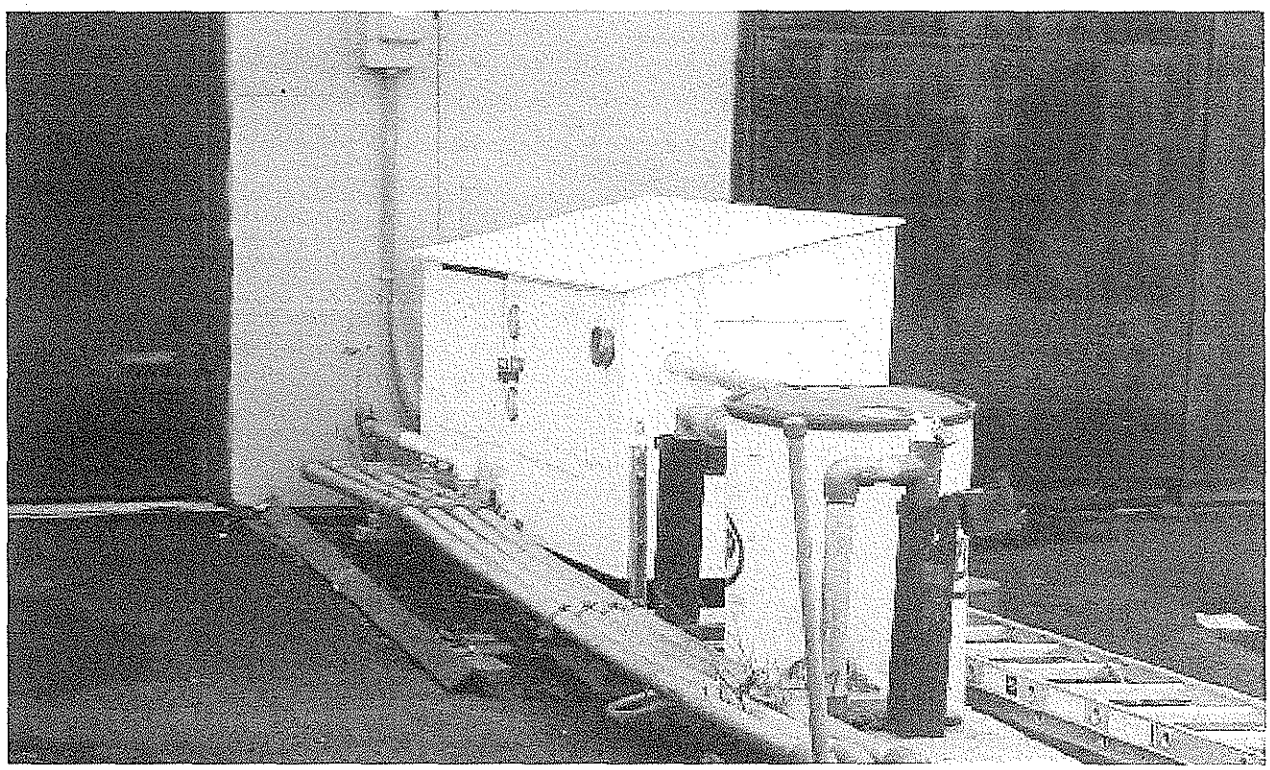
Activated Carbon Dual-Bed Adsorption System Wainwright Operable Unit (WOU)



Wainwright Operable Unit (WOU) GETS Air Stripping Tower (background) and Exhaust (foreground); SVE Exhaust Vent System (foreground, right)

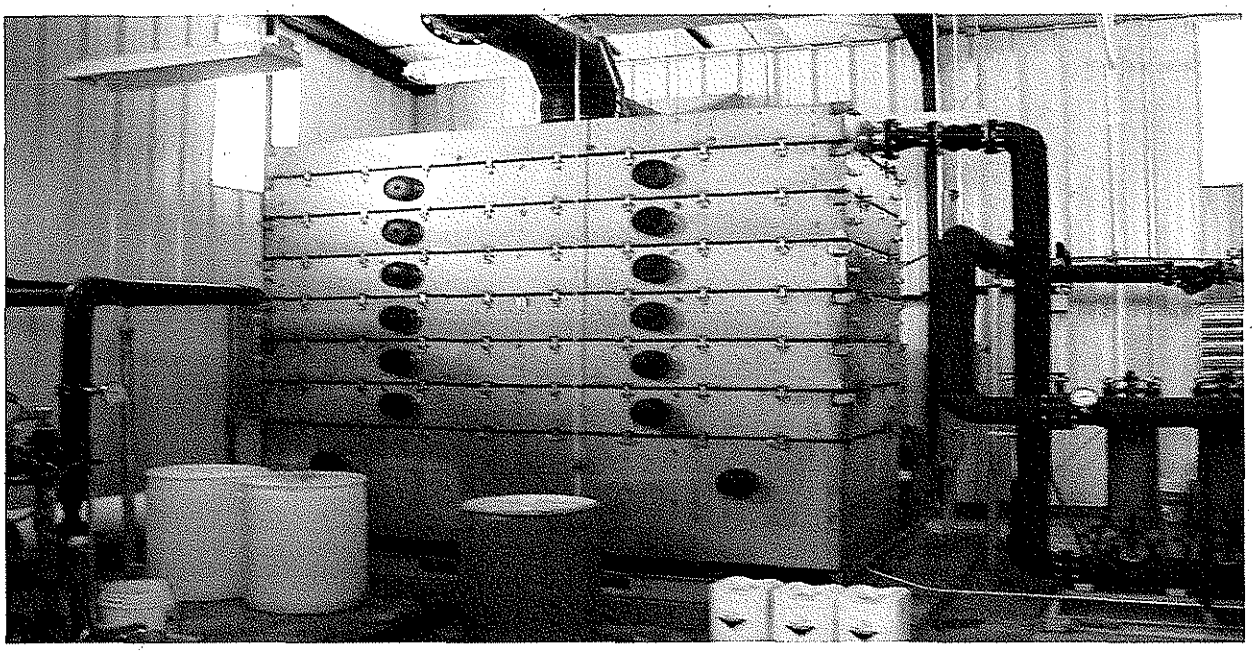


SVE Manifold Control Box For Horizontal and Vertical SVE Wells \\ Wainwright Operable Unit (WOU)

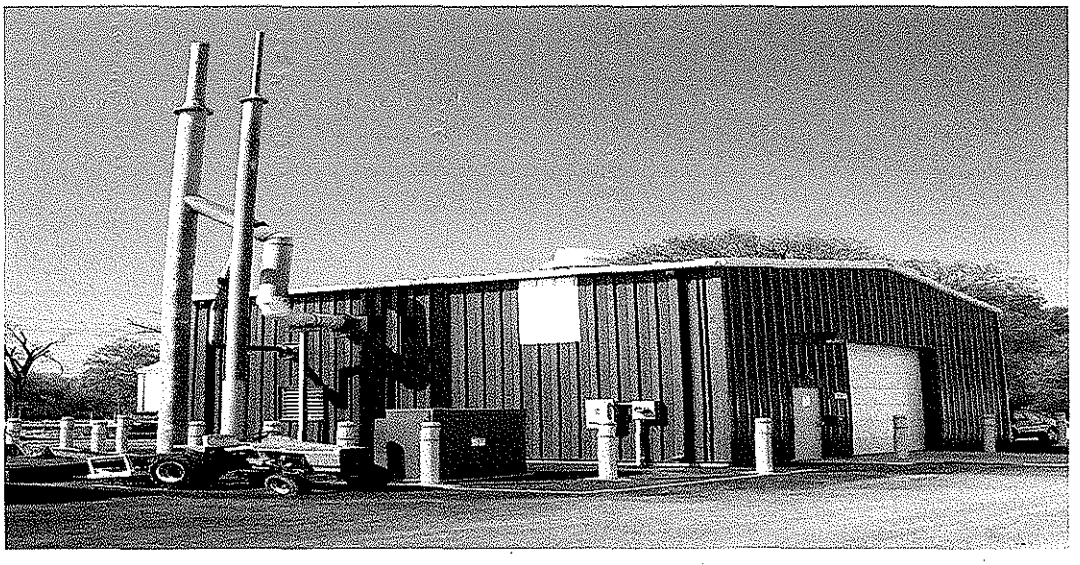


Operable Unit 2:

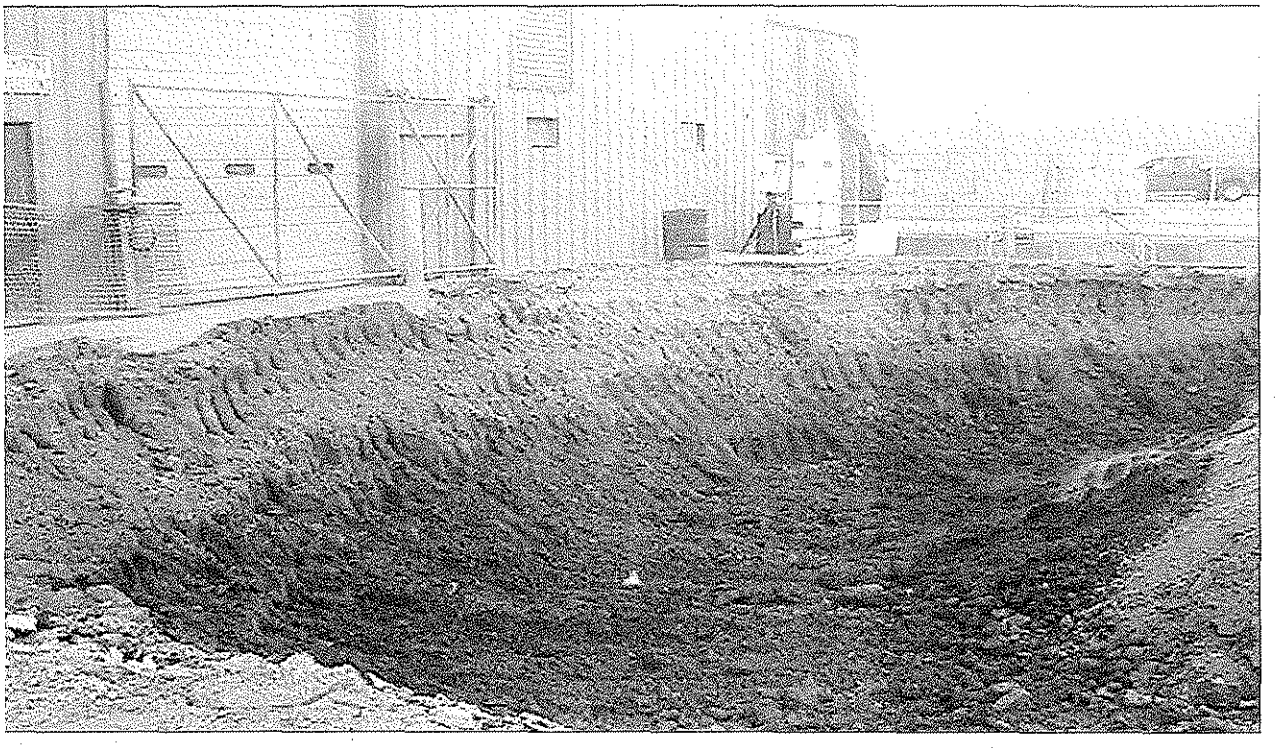
AIR STRIPPER



TREATMENT BUILDING AND AIR DISCHARGE STACKS



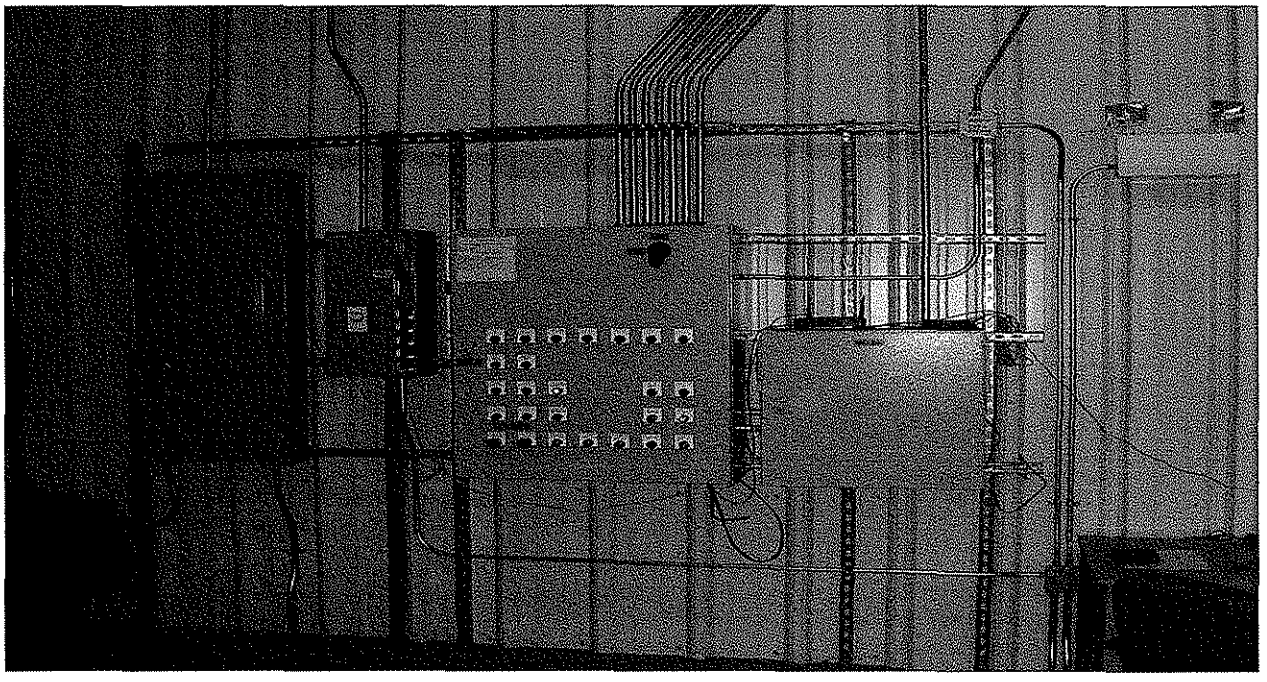
SOIL SOURCE AREA NEXT TO VALLEY TECHNOLOGIES BUILDING



SOIL SOURCE AREA NEXT TO ALLEY ON VALLEY TECHNOLOGIES PROPERTY

FLOWABLE FILL

ELECTRONIC CONTROLS SYSTEM



Attachment C

PUBLIC NOTICE AND SITE FACT SHEET

Commission mulls options for renovating county buildings

Tax increases, bond issue possible solutions

By Steve Birmingham
Staff writer

A panel will try to decide later this month how to pay for the rehabilitation or construction of new St. Louis County government buildings.

The county's Capital Investment Blue Ribbon Commission, formed earlier this year by St. Louis County Executive Charlie A. Dooley, discussed recommendations from county administrators at its May 6 meeting, including bond issues and sales/use taxes.

The commission plans to discuss the options at its May 22 meeting. A location for the meeting, open to the public, is yet to be determined.

The commission, chaired by former 3rd District St. Louis County Councilman Skip Mange, will help produce an official recommendation for Dooley, who would then pass it on to the St. Louis County Council sometime this summer, David Wrone, spokesman for the St. Louis County Department of Public Works, said.

"Supporters of the tax proposals need to know which are not viable," Mange said. "They should not anticipate that all of them are politically available."

Mange said he had no opinion yet on the options mentioned by county staff.

"All we're trying to do really is get an understanding of what the alternatives are and then prioritize them," Mange said. "We're still gathering all kinds of information and all our choices, understanding what each of them is and finding out what the other taxing authorities are going to be doing, and then try to put together a recommendation."

The commission is made up of Mange; Frederick Douglas, chairman of the Workforce Investment Board; David Mason, of David Mason & Associates; Don Musick, of Don C. Musick Construction Company; James Qin, of Q&C International; Pat Kellett, business manager for Local 562 of the Plumbers and Pipefitters Union; John Siscel, former executive director of the Mechanical Contractors Association; Nancy Cross, Missouri director for Local 1 of the Service Employees International Union; Sally Roth, of Regions Bank; George Brill, of Talisen Tech; St. Louis County Council members Colleen Wasinger, R-3rd, Hazel Erby, D-2nd, and Barbara Fraser, D-8th; Judith Metzger, of Knoll, Inc.; and Clayton Alderman Steve Lichtenfeld.

St. Louis County Director of Administration Pam Reitz, Public Works and Highways and Traffic Director Sheryl Hodges and Dooley's assistant, Darin Cline, told the commission last week that many of the county's Clayton-based buildings are old, cramped and in need of maintenance-related money, Wrone said.

Tops on the list were a new family courts building, a new animal shelter and new office space to which county operations from two buildings at 111 and 121 S. Meramec Ave., could be transferred.

One potential plan would be to demolish the Meramec Avenue buildings to clear the way for a new family courts building that could be physically connected to the St. Louis County Courthouse and Buzz Westfall Justice Center, Wrone said.

Among the problems listed at existing county buildings were antiquated elevator systems and heating and cooling systems, corroded pipes, cracked concrete, and leaking roofs and windows.

The county's parks system and arterial roads also need "a significant, additional cash infusion" with a funding need of $430 million to $530 million in the next 10 to 20 years, the commission was told.

You can contact Steve Birmingham at sbirmingham@yourjournal.com.

Tax relief

A county panel will soon discuss possible ways to pay for rennovations to county government buildings. Among the options the to be considered are:

- Placing a $120 million no-tax-increase general obligation bond issue for new buildings and building improvements on a future election ballot. If passed, it would extend retirement of bond obligations by 15 years.
- A sales tax increase on Metro-Bus and MetroLink ticket sales for road projects would go to the transit system but the amount the county provides Metro through a separate sales tax would be reduced by $5 million a year.
- A one-eighth-cent parks sales tax for park improvements and operations, which would produce $14 million a year and take the county's current one-cent parks sales tax and transfer that money to the county's general operations fund.
- A 1.85-cent use tax for public safety, park improvements and economic development and local government services. A sales tax on all out-of-state purchases, a use tax is estimated to raise $30 million annually.

U.S. Environmental Protection Agency (EPA) Region 7
and
Missouri Department of Natural Resources (MDNR)
to conduct
Second Five-Year Review for the
Valley Park TCE Superfund Site
Valley Park, St. Louis County, Missouri

EPA and MDNR have begun the second Five-Year Review at the Valley Park TCE Superfund Site. The review is required by the Superfund law to make sure the cleanup continues to protect human health and the environment.

The Administrative Record is available at the following locations during normal business hours:

Valley Park Public Library
320 Benton St.
Valley Park, Mo.

EPA Region 7 Records Center
901 N. Fifth St.
Kansas City, Kan.

Questions or requests for information can be submitted to:

Fritz Hirter
Community Involvement Coordinator
U.S. EPA Region 7
901 N. Fifth St.
Kansas City, KS 66101
Toll free: (800) 223-0425
e-mail: hirter.fritz@epa.gov

Fact Sheet

Region 7

Iowa
Kansas
Missouri
Nebraska
Nine Tribal Nations

April 2008

Second Five-Year Review to Begin
Valley Park TCE Site
Valley Park, St. Louis County, Missouri

Introduction

The U.S. Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (MDNR) conduct regular reviews on Superfund sites where cleanups have been completed. These reviews are required by the Superfund law [42 U.S.C. Section 9621(c)]. The Agencies have started the second five-year review of the Valley Park TCE Superfund site in Valley Park, St. Louis County, Missouri.

Background

The Valley Park TCE site is located within Valley Park, Missouri and unincorporated areas to the east of the City. The site consists of soil and ground water contaminated by chlorinated solvents within the Meramec River alluvial aquifer.

In 1982, MDNR detected volatile organic compounds (VOCs) including tetrachloroethene (PCE), trichloro-ethene (TCE) and 1,1,1-trichloroethane (TCA) in samples collected from three Valley Park municipal wells. In response to the contamination, the City installed equipment to remove VOCs from drinking water. Since 1988, Valley Park residents have been connected to the St. Louis County public water system. Therefore, Valley Park residents are no longer using contaminated water for domestic purposes.

EPA and MDNR determined that the sources of contamination originated from a former Wainwright Industries property and a current Valley Technologies, Inc. property located in Valley Park. Wainwright and Valley Technologies both used chlorinated degreasers and solvents for cleaning purposes.

The site has been managed according to the two, separate source areas.

Operable Units 1 and 3 (OU1 and OU3) are the ground water and soil cleanups at the former Wainwright source area, respectively.

Operable Unit 2 (OU2) involves the cleanup of the soil and ground water at the Valley Technologies source area.

The site was placed on the National Priorities List on June 10, 1986. Cleanup actions were defined in Records of Decision (ROD) for OU1and OU3 in 1994 and for OU2 in 2001. Both RODs were modified as defined in 1996 and 2005 Explanation of Significant Difference documents. The remedies for both source areas included:
1) excavation of the most highly contaminated soils,
2) soil vapor extraction of soils contaminated at lower levels, and
3) extraction and treatment of contaminated ground water.

The remedial actions for both RODs have been constructed and implemented. The operation and maintenance of the systems are ongoing.

Wainwright Industries is conducting the cleanup action at their former property following a consent decree with MDNR. EPA is conducting the cleanup action at the Valley Technologies property. Both Wainwright and Valley Technologies have settled their respective liabilities with EPA.

The first Five-Year Review report was completed in September of 2003.

The Five-Year Review

The Agencies will study the site information during this second five-year review and inspect the site to determine if the remedy continues to protect human health and the environment. The Agencies encourage members of the community to ask questions and report any concerns about the site.

A final report will be prepared at the end of the review and will be available at the site information repositories.

ATTACHMENT D

WOU INSPECTION CHECKLIST

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Valley Park TCE - Wainwright Operable Unit (WOU) [OU1 & OU3 = WOU]	**Date of inspection: April 24, 2008**
Location and Region: Valley Park, MO – Region 7	**EPA ID: MOD980968341**
Agency, office, or company leading the five-year review: MDNR & EPA	**Weather/temperature: Cloudy, rain/ 45°F**

Remedy Includes: (Check all that apply)

- fl Cover/containment (asphalt cap)
- _ Access controls
- fl Institutional controls
- fl Groundwater pump and treatment
- _ Surface water collection and treatment
- fl Other: In-situ SVE & air stripping
- _ Monitored natural attenuation
- X Groundwater containment - hydraulic control
- _ Vertical barrier walls

Attachments: fl Site location map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Gregg Wilson (Name) Engineering Manager (Title) 4/24/2008 (Date)
   Interviewed fl at site _ at office _ by phone Phone No. 636-2785850 ext 3010
   Problems, suggestions; _ Report attached Lower than expected vacuum pressures for *in situ* SVE wells due to higher than normal groundwater saturation due to rising river levels nearby and operational constraints; low production rate from extraction well RW-1 due to suspected plugging of well screen.

2. **O&M staff** N/A (Name) _____ (Title) _____ (Date)
   Interviewed _at site _at office _by phone Phone no. _____
   Problems, suggestions; _ Report attached _____

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - fl O&M manual — Readily available — fl Up to date — _ N/A
   - fl As-built drawings — Readily available — fl Up to date — _ N/A
   - fl Maintenance logs — Readily available — fl Up to date — _ N/A

   Remarks: Records are stored and maintained at Wainwright's active facility.

2. **Site-Specific Health and Safety Plan** — Readily available — fl Up to date — _ N/A
   - fl Contingency plan/emergency response plan — Readily available — fl Up to date — _ N/A

   Remarks: Records stored and maintained at Wainwright's active facility.

3. **O&M and OSHA Training Records** — Readily available — fl Up to date — _ N/A
   Remarks: Records are stored and maintained at Wainwright's active facility.

4. **Permits and Service Agreements**
   - _ Air discharge permit — _ Readily available — _ Up to date — fl N/A
   - fl Effluent discharge — _ Readily available — fl Up to date — _ N/A
   - _ Waste disposal, POTW — _ Readily available — _ Up to date — X N/A
   - _ Other permits_____ — _ Readily available — _ Up to date — X N/A

   Remarks: Records stored and maintained at Wainwright's active facility.

5. **Gas Generation Records** _ Readily available _ Up to date fl N/A
Remarks_____
_

6. **Settlement Monument Records** _ Readily available _ Up to date fl N/A
Remarks_____
_

7. **Groundwater Monitoring Records** _ Readily available _ Up to date , N/A
Remarks: Site is operated and maintained by Wainwright, but the property is not owned and occupied by Wainwright. Therefore, only a limited set of documents may be stored on-site. Groundwater monitoring records are stored and maintained at Wainwright's active facility.

8. **Leachate Extraction Records** _ Readily available , Up to date fl N/A
Remarks_____
_

9. **Discharge Compliance Records**
_ Air _ Readily available _ Up to date fl N/A
fl Water (effluent) , Readily available fl Up to date _ N/A
Remarks: Compliance records are stored and maintained at Wainwright's active facility.

10. **Daily Access/Security Logs** , Readily available , Up to date fl N/A
Remarks Site secured._____

IV. O&M COSTS

1. **O&M Organization**
_ State in-house _ Contractor for State
fl PRP in-house fl Contractor for PRP
_ Federal Facility in-house _ Contractor for Federal Facility
Other_____

2. **O&M Cost Records**
_ Readily available _ Up to date _ N/A
fl O^Vrnding mechanism/agreement in place
Original O&M cost estimate_____ _ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ _ Breakdown attached
Date Date Total cost
From_____ To_____ _____ , Breakdown attached
Date Date Total cost
From_____ To_____ _____ , Breakdown attached
Date Date Total cost
From_____ To_____ _____ , Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons Not applicable

V. ACCESS AND INSTITUTIONAL CONTROLS fl Applicable _ N/A

A. Fencing

1. **Fencing damaged** _ Location shown on site map fl Gates secured _ N/A
   Remarks Gates are left open during the day when site personnel are conducting business, but buildings and gates are secured after hours.

B. Other Access Restrictions

1. **Signs and other security measures** _ Location shown on site map X N/A
   Remarks _____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
   Site conditions imply ICs not properly implemented _ Yes fl No _ N/A
   Site conditions imply ICs not being fully enforced _ Yes fl No _ N/A

   Type of monitoring (*e.g.*, self-reporting, drive by) _____
   Frequency _____
   Responsible party/agency _____
   Contact _____ _____ _____ _____
   Name Title Date Phone no.

   Reporting is up-to-date , Yes _ No X N/A
   Reports are verified by the lead agency , Yes _ No X N/A

   Specific requirements in deed or decision documents have been met fl Yes _ No _ N/A
   Violations have been reported _ Yes X No _ N/A
   Other problems or suggestions: _ Report attached
   Deed restriction filed with the St. Louis County, Missouri Recorder's Office. No ongoing reporting is required.

2. **Adequacy** fl ICs are adequate _ ICs are inadequate _ N/A
   Remarks: Deed restriction prevents installation or use, including allowing others to install or use any groundwater supply wells on the premises.

D. General

1. **Vandalism/trespassing** _ Location shown on site map fl No vandalism evident
   Remarks _____

2. **Land use changes on site** _ N/A
   Remarks: Current property owner developing more space by resurfacing more areas of the site.

3. **Land use changes off site** fl N/A
   Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads _ Applicable fl N/A

1. **Roads damaged** _ Location shown on site map _ Roads adequate fl N/A
   Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS _ Applicable X N/A

A. Landfill Surface

1. **Settlement** (Low spots) _ Location shown on site map _ Settlement not evident
   Areal extent_____ Depth_____ _ N/A
   Remarks_____

2. **Cracks** _ Location shown on site map _ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** _ N/A
   Areal extent_____ Depth_____
   Remarks_____
   _

4. **Holes** _ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _

5. **Vegetative Cover** _ N/A
   _ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _

6. **Alternative Cover (armored rock, concrete, etc.)**
   Remarks_____
   _

7. **Bulges** _ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _

8. **Wet Areas/Water Damage** fl Wet areas/water damage not evident
   _ Wet areas _ Location shown on site map Areal extent_____
   _ Ponding _ Location shown on site map Areal extent_____
   _ Seeps _ Location shown on site map Areal extent_____
   _ Soft subgrade _ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** _ N/A
   Areal extent_____
   Remarks_____
   _

B. Benches fl N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** _ Location shown on site map fl N/A or okay
Remarks_____
_

2. **Bench Breached** _ Location shown on site map fl N/A or okay
Remarks_____
_

3. **Bench Overtopped** _ Location shown on site map fl N/A or okay
Remarks_____
_

C. Letdown Channels fl N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** _ Location shown on site map _ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** _ Location shown on site map _ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** _ Location shown on site map _ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_

4. **Undercutting** _ Location shown on site map _ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_

5. **Obstructions** Type_____ _ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_

6. **Excessive Vegetative Growth** Type_____
_ No evidence of excessive growth
_ Vegetation in channels does not obstruct flow
_ Location shown on site map Areal extent_____
Remarks_____
_

D. Cover Penetrations fl Applicable

1. X Soil Vapor Extraction Wells fl Active _ Passive
fl Properly secured/locked X Functioning fl Routinely sampled fl Good condition
_ Evidence of leakage at penetration _ Needs Maintenance
_ N/A
Remarks: Vacuum service lines from above-ground conveyance segments of in situ SVE vents replaced with new PVC pipe.

2. **Gas Monitoring Probes**
, Properly secured/locked , Functioning , Routinely sampled , Good condition
_ Evidence of leakage at penetration _ Needs Maintenance fl N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of cover)
fl Properly secured/locked X Functioning fl Routinely sampled fl Good condition
_ Evidence of leakage at penetration _ Needs Maintenance _ N/A
Remarks: Well risers replaced where needed with new PVC pipe during routine maintenance.

4. **Leachate Extraction Wells**
_ Properly secured/locked , Functioning _ Routinely sampled _ Good condition
_ Evidence of leakage at penetration _ Needs Maintenance fl N/A
Remarks_____
_

5. **Settlement Monuments** _ Located _ Routinely surveyed fl N/A
Remarks_____
_

VIII. VERTICAL BARRIER WALLS fl N/A

1. **Settlement** _ Location shown on site map _ Settlement not evident
Areal extent_____ Depth_____
Remarks_____
_

2. **Performance Monitoring** Type of monitoring _____ _ Performance not monitored
Frequency_____ Evidence of breaching
Head differential_____
Remarks_____
_

C. Treatment System X Applicable _ N/A

1. **Treatment Train** (Check components that apply)
_ Metals removal _ Oil/water separation _ Bioremediation
fl Air stripping fl Carbon absorbers
_ Filters
_ Additive (*e.g.*, chelating agent, flocculent)
_ Others In situ SVE
fl Good condition _ Needs Maintenance
fl Sampling ports properly marked and functional
, Sampling/maintenance log displayed and up to date
fl Equipment properly identified
fl Quantity of groundwater treated annually: _____
Remarks: System has been approved. Quarterly status reports have been timely submitted for groundwater and SVE monitoring and operating parameters. Additional performance monitoring has been conducted for further evaluation of the SVE system..

2. **Electrical Enclosures and Panels** (properly rated and functional)
_ N/A fl Good condition _ Needs Maintenance
Remarks: Electrical system for groundwater pumping system checked in 2006 for proper operation.

3. **Tanks, Vaults, Storage Vessels**
_ N/A fl Good condition _ Proper secondary containment _ Needs Maintenance
Remarks Applies to carbon absorption bed units.

4. **Discharge Structure and Appurtenances**
fl N/A _ Good condition _ Needs Maintenance
Remarks_____
_

5. **Treatment Building(s)**
_ N/A fl Good condition (esp. roof and doorways) _ Needs repair
fl Chemicals and equipment properly stored
Remarks_____
_

6. **Monitoring Wells** (pump and treatment remedy)
fl Properly secured/locked fl Functioning X Routinely sampled fl Good condition
fl All required wells located _ Needs Maintenance _ N/A
Remark Routine sampling has been conducted starting December 2003.

D. Monitoring Data

2. 1. Monitoring Data
fl Is routinely submitted on time fl Is of acceptable quality
Remarks_____
_

3. 2. Monitoring data suggests:
fl Groundwater plume may not be effectively contained
fl Groundwater target contaminant concentrations are decreasing (asymptotic appearance)
X *In situ* SVE vacuum pressure may not be adequately applied at all time due to water (moisture) infiltration; reduced pumping rate of extraction well due to possible plugging of screen.

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
_ Properly secured/locked _ Functioning _ Routinely sampled _ Good condition
_ All required wells located _ Needs Maintenance fl N/A
Remarks_____
_

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The purpose of the remedy is to: provide for hydraulic control of the local aquifer at the WOU, extract and treat contaminated groundwater to remove groundwater contamination, and remove soil-bound contamination above the water table that would act as a source for leaching into groundwater. The treatment system is functioning as intended under the remedy; however, the rate of removal for the SVE system requires further investigation to determine if the SVE systems needs to be expanded or improvements made to achieve the ten-year cleanup time frame under the remedy. Further, the protectiveness of the remedy to provide hydraulic control of dissolved contaminants may be comprised in the future if the pumping rate of the extraction well is not restored to its approved rate of about 100 gpm. Although contaminants are being removed from the subsurface, it is uncertain whether the remedy can be completed within a ten-year time frame that may be attributed to but not necessarily limited to the following: low desorption rates of contaminants sorbed to the soil, diffusion-controlled removal of contaminants within low permeability zones, extraction wells that are not properly located or screened to treat all contaminated areas, the presence of a continuing source of contaminates which is preventing cleanup using SVE in a reasonable time frame, or an uncontrolled source area continues to release contaminants.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

The protectiveness of the remedy may be impaired due to the decrease in the pumping rate of extraction well to provide for hydraulic control of contaminants in the aquifer.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Opportunity for optimization of the selected remedies should be investigated and implemented when improvements are warranted. Several optimization strategies should be evaluated for the SVE system. Suggested strategies for evaluation are: "pulse" wells to reduce air flow rates to correspond to contaminant desorption and/or diffusion rates; install additional wells in the contaminated areas; conduct further characterization of the extent of contamination to determine if isolated areas are present; install wells with screens isolated in different areas or to the most productive soil layers, or pack off unproductive intervals in existing wells; implement source control including excavation, if feasible; and evaluate alternate technologies such as controlled chemical oxidation or biological treatment.