REMEDIAL ACTION PLAN AND SVE SYSTEM DESIGN REPORT

ONE HOUR MARTINIZING CLEANERS
6737 MILWAUKEE AVENUE
WAUWATOSA, WI 53511
BRRTS# 02-41-551923

October 17, 2018

Prepared By:

EnviroForensics, LLC
N16W23390 Stone Ridge Drive, Suite G
Waukesha, WI 53188
Phone: (262) 290-4001
www.enviroforensics.com

Andrew D. Horwath, PE
Senior Engineer

Wayne Fassbender, PG, PMP
Senior Project Manager

Document: 6140-0764

TABLE OF CONTENTS

CERTIFICATIONS

I, Andrew Horwath, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Andrew D. Horwath Senior Engineer, Lic. No. E-43831-6

Signature, title and P.E. number

P.E. stamp

I, Wayne Fassbender, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Wayne P. Fassbender Senior Project Manager

Signature and title

Date: October 17, 2018

EXECUTIVE SUMMARY

EnviroForensics, LLC (EnviroForensics) has prepared this Remedial Action Plan and SVE System Design Report (Report) on behalf of OHM Holdings, Inc. for the One Hour Martinizing Cleaners facility located at 6737 Milwaukee Avenue, Wauwatosa, Wisconsin (Site). Historic releases of the dry cleaning solvent tetrachloroethene (PCE) to the subsurface have occurred at the Site during its former operation as an active dry cleaning facility. Pure PCE product does not appear to have been released in significant quantities because concentrations of PCE are low and not indicative of pure PCE. In addition, very little natural degradation of PCE has occurred to produce daughter compounds such as trichloroethene, dichloroethene, or vinyl chloride. Residual PCE impacts in soil have not resulted in detectable concentrations in groundwater to date (the water table resides at depths of approximately between 48 and 52 feet below ground surface (bgs) across the Site and fluctuates approximately 1.0 to 1.5 feet seasonally). However, PCE vapors have accumulated beneath the Site building and an adjacent commercial building to the south in concentrations that pose a vapor intrusion risk.

Some active remediation is required to reduce contaminant concentrations to levels that will not continue to pose a vapor intrusion risk or a risk for groundwater impacts. Soil impacts targeted for remediation are located at depths up to 18-20 feet bgs and much of the contaminant mass is located beneath the dry cleaner building. Therefore, excavation of this material is not feasible. Site soil consists mainly of silty sand and gravel which is permeable and readily transmits soil vapor (as opposed to a clay or silt matrix), and is conducive to remediation by soil vapor extraction (SVE). SVE is a time-tested method and is a practical remedial method that can be utilized effectively at this Site. The primary objectives of SVE are to remove contaminant mass from soil and reduce the potential for vapor intrusion in the Site building and adjacent commercial structure.

The SVE system has been designed using the results of an SVE pilot study conducted in 2016. The system will consist of four (4) extraction wells connected to the SVE mechanical equipment via sub-grade piping. The system will be operated at the vacuum necessary to achieve the desired radius of influence (ROI). Operation and maintenance (O&M) activities for the SVE system will be conducted routinely to optimize system efficiency. Performance monitoring, including subsurface vacuum measurements and effluent sampling of PCE concentrations, will be performed to verify the ROI and calculate contaminant mass removal rates. The overall effectiveness of SVE will be evaluated by confirmation soil and soil vapor sampling.

A Construction Documentation Report will be prepared that documents as-built construction of the SVE system and the final O&M Plan for the SVE system. Semi-annual progress reports will be submitted to WDNR, as required, during remediation.

1.0 INTRODUCTION

EnviroForensics, LLC (EnviroForensics) has prepared this Remedial Action Plan and SVE System Design Report (Report) on behalf of OHM Holdings, Inc. (OHM) pertaining to construction of a soil vapor extraction (SVE) system at their property located at 6737 Milwaukee Avenue, Wauwatosa, Wisconsin (Site). The location of the Site is shown on **Figure 1**. The goal of the SVE system is to achieve reduction of unsaturated soil impacts that are currently producing tetrachloroethene (PCE) vapors which pose a risk of intrusion to the Site building and nearby commercial structure. This Report follows guidelines for remedial action design set forth in Wisconsin Administrative Code (WAC) Chapter NR 724 rule and other associated State of Wisconsin Chapter NR 700 series rules. The design criteria for the SVE system, including engineering plans and specifications, is provided in this Report.

This Report follows submittal of the Site Investigation Report, dated January 19, 2016, with approval and conditions by the Wisconsin Department of Natural Resources (WDNR) on February 27, 2018. The conditions included a request by the WDNR for additional on-site and off-site investigations to determine the extents of residual PCE impacts. During meeting discussions with the WDNR held on May 17, 2018, it was agreed that these investigations would be completed following remedial actions. The intent to sample soil after remedial actions was confirmed in a letter to the WDNR dated June 28, 2018.

A request to re-enter the Dry Cleaner Environmental Response Fund (DERF) reimbursement program for funding of the remedial actions, along with a request for variance from the consultant bidding process, was approved by the WDNR on June 11, 2018.

2.0 SITE BACKGROUND

Site investigation activities began at the Site by Giles Engineering & Associates, Inc. (Giles Engineering) in 2008. EnviroForensics assumed management of investigation activities in 2009 with completion of a Site Investigation Report in 2016, and soil vapor extraction remedial pilot testing completed in 2017. This section describes the Site and presents a brief history.

2.1 Geographic Information

The layout of the Site, including Site features, and the surrounding area, is depicted on **Figure 2**. The Site is improved with a slab-on-grade, one story building and asphalt/concrete parking and driveway areas. There are no surface water features or private wells on the Site. The Site is bound by Milwaukee Avenue to the north; North 68th Street to the west; a commercial property (1536 N. 68th Street) to the south; and a residential property (6721 Milwaukee Avenue) to the east. The adjacent commercial property to the south is currently occupied as office space for an accounting firm. The surrounding area consists of a mix of residential and commercial properties.

2.2 Site History

The Site operated as a gasoline service station from at least 1927 up to the late 1970's or early 1980's. The property was purchased as a vacant gasoline service station by OHM in 1982. The underground gasoline storage tanks were removed by the previous owners. An underground heating oil tank was removed from the Site in 1997 under the current ownership.

OHM operated the Site as an active dry cleaning facility beginning in 1982. The former dry cleaning machine was located on the eastern portion of the building and is no longer present. PCE was the main dry cleaning solvent used in the cleaning process until its use was discontinued at this facility in 2009. Since 2009, the site has been a drop-off location for clothes cleaned at a central facility. OHM discontinued the use of PCE in their dry cleaning process in January of 2014, in favor of a more environmentally friendly solvent.

In 2008, during initial discovery investigations performed by Giles Engineering, PCE was detected in subsurface soil indicating that a release of PCE had occurred at the Site sometime in the past. The amount of chemical released, the duration of the release, and the specific release areas or locations are unknown, but the source areas are below the building foundation near the

old dry cleaning machine, and also outside the building near a storage shed. This would indicate that floor spills occurred inside the building that may have entered the subsurface through the joint between the floor slab and outside wall, or into a floor drain which may have leaked. The soil impacts near the storage shed were likely caused by spillage. It is not known whether these incidental releases were of fresh or waste product.

2.3 Hydrogeologic Setting

The Site lithology is comprised of poorly sorted glacially deposited till generally consisting of silty, clayey, sand and gravel with interspersed and discontinuous lenses of silty clay and sandy clay, which are typically between 1-2 feet thick. Coarser material consisting of sand and gravel with varying amounts of silt and clay appear to be predominant. A 10-feet thick clay layer is encountered just above the water table at a depth of between 45 to 55 feet. The surface of the water table as measured in monitoring wells exists at depths of between 48 to 52 feet below ground surface (bgs) on Site and fluctuates between 1.0-1.5 feet seasonally. The direction of groundwater flow is consistently toward the northeast.

2.4 Subsurface Impacts

The extent of soil impacts is shown on **Figure 3**, and the extent of soil vapor impacts is shown on **Figure 4**. PCE is the primary compound detected with only minimal detections of compounds associated with the natural degradation of PCE. No chlorinated volatile organic compounds (CVOCs) were detected in groundwater during the course of Site investigations; therefore, proposed remedial actions are not targeting groundwater.

As seen on **Figure 3**, a primary source area for PCE soil contamination was identified underneath the east side of the OHM building, where the dry cleaning machine was formerly located. Up to 510 micrograms per kilogram (µg/kg) of PCE were detected at that location, diminishing with depth. A secondary location of PCE-impacted soil was identified on the southeast portion of the Site, adjacent to a storage shed. Up to 530 µg/kg of PCE were detected at this location, again diminishing with depth.

Soil contaminant concentrations were compared to WDNR Residual Contaminant Levels (RCL), which are based on the United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSL). At many locations, the concentrations exceed the RCL established for protection of groundwater; however, none of the PCE concentrations in the shallow soil

exceeded the RCLs for direct contact in either residential or non-residential settings. Potable water is supplied to the City of Wauwatosa from Lake Michigan.

As can be seen on **Figure 4**, CVOC vapors have accumulated beneath the Site building (slab on grade) and adjacent commercial building to the south (basement slab) in concentrations that exceed the Vapor Risk Screening Levels (VRSLs) for non-residential settings. Sub-slab vapor samples collected at SSV-2 in the Site building contained PCE at up to 20,600 micrograms per cubic meter (µg/m^3), and the northwest corner of the basement in the commercial property to the south contained PCE at up to 12,400 µg/m^3. In addition, indoor air samples collected from the Site building contained PCE above the non-residential Vapor Action Level. At the time of indoor air sampling, solutions containing CVOCs were being used in the building to remove stubborn stains from dry cleaned clothes and the old dry cleaning machine was still within the building. A field screening of vapors using a photoionization detector (PID) was performed at that time. The PID readings indicated elevated volatile organic compound readings near the unused dry cleaning machine. Since the last indoor air sampling event, the deactivated dry cleaning machine has been removed.

Additional subsurface data was collected in August of 2018 from the adjacent Milwaukee Avenue and 68th Street roadways. PCE was detected in soil and soil gas along the sanitary lateral leading to the main in Milwaukee Avenue indicating that lateral acted as a migration conduit to a limited degree. The concentrations in soil at direct push boring DP-2 shown on **Figure 3** are below the RCLs for direct contact exposure, but above the RCL for protection of groundwater. Soil vapor sample SG-2 collected close to the lateral and at the approximate depth of the lateral contained PCE at a concentration of 3,720 µg/m^3 and trichloroethene (TCE) at a concentration of 91.4 µg/m^3 which are below the VRSLs for these compounds (**Figure 4**). Soil vapor sample SG-1 located east along the sanitary main contained PCE at a concentration of 404 µg/m^3 and TCE at a concentration of 34.9 µg/m^3, which are less than their respective VRSLs for these compounds.

2.5 SVE Pilot Testing

SVE pilot testing was performed by EnviroForensics in June of 2016. A copy of the full pilot test report is included in **Appendix A**. Two (2) soil vapor extraction wells were installed to facilitate testing and several existing and newly installed vapor monitoring points were used to measure negative pressures during the test. The two (2) extraction wells consisted of one (1) shallow well screened from 3-5 feet bgs; and one (1) deeper well screened from 10-20 feet bgs.

The data collected during testing supports using SVE to effectively remediate the Site. The radius of negative pressures propagated outward over 50 feet using the shallow SVE well and almost to 80 feet using the deeper SVE well. Based on this data, a minimal number of extraction wells are needed to create an effective remediation zone.

3.0 REMEDIAL ACTIVITIES

The recommended closure strategy is a combination of active remediation and possible passive risk management methods. The remedial action for soil will consist of SVE. The use of SVE should eliminate the current risk of vapor intrusion to indoor air at the Site building and adjacent commercial building to the south. The SVE system will also reduce the mass of CVOCs in soil which will in turn reduce the risk of reoccurring accumulation of sub-slab vapor and the risk of eventual migration to groundwater.

Site closure may involve using various passive risk management measures such as the use of cap maintenance to retain the building slab and outside paving as an engineered barrier to further prevent the downward migration of CVOC impacts in soil to the water table. However, the need for further engineered barriers or institutional controls such as Site use restrictions will be assessed following active remediation.

3.1 Soil Vapor Extraction (SVE)

SVE technology will be used to remediate vadose zone soil impacts beneath and around the Site building. The primary objective of SVE is to remove contaminant mass from vadose zone soil to concentrations that no longer pose a risk of vapor intrusion to the Site building and commercial building located adjacent to the south.

The SVE system is designed to extract soil vapor and consists of four (4) extraction wells installed around the perimeter of the Site building, below grade piping, and the SVE mechanical components. The results of 2016 pilot testing and distribution of Site contaminants were utilized to create the SVE extraction layout. The design radius of influence (ROI) of each deep SVE well is estimated to be approximately 79 feet, while the ROI for the shallow well was estimated to be 52 feet. Applied vacuum were determined to be 6.2 inches mercury (inHg) in the deeper zone, and 10 inHg in the shallow zone, with flow rates between 100 and 285 actual cubic feet per minute (acfm).

The following sections describe the SVE system design, operation and maintenance activities, and performance monitoring program.

3.1.1 Permitting

Construction and operation permits apply to remediation systems that emit contaminants under WAC Chapters NR 406 and 407, respectively. The following permitting thresholds apply to remediation systems, regardless of whether or not emissions control devices are used:

- Total volatile organic compound (VOC) emissions greater than 5.7 pounds per hour (lb/hr) [NR 406.04(1)(m)2]; and

- Assuming a stack height less than 25 feet, PCE emissions greater than 9.11 lb/hr or 301 pounds per year (lb/yr) [NR 407.03(1)(sm)].

The sampling data collected during the 2016 SVE pilot test indicated a CVOC mass removal rate of less than 100 lb/yr at startup. Therefore, EnviroForensics anticipates that the SVE system will be exempt from permitting requirements. However, the SVE system is designed so that carbon treatment can easily be added if necessary to reduce the concentrations of CVOCs to below the permit thresholds. It is also possible to raise the stack height above 25 feet, which increases the acceptable CVOC emission limits.

Ambient air quality criteria defined in WAC Chapter NR 445.07 also apply to remediation systems. For example, the concentration of PCE must be less than 4,069 $\mu g/m^3$ in ambient air while the SVE system is operating. The monitoring program designed to ensure compliance with all emissions and air quality standards is described in Section 3.3.

3.1.2 Infrastructure Installation

Two (2) extraction wells previously installed for pilot testing (SVE-1s and SVE-1d) will be used as points of soil vapor extraction, along with two (2) new extraction wells identified as SVE-2 and SVE-3 on **Figure 5**. SVE-2 will be located to reduce contaminant mass detected near a small storage shed which is the suspected site of a surface spill. Extraction well SVE-3 has been located on the north side of the building to supplement reduction of CVOC concentrations below the Site building slab, facilitate collection of soil vapors and reduce soil concentrations along the sanitary sewer lateral.

The new extraction wells will be constructed of 4-inch diameter schedule 40 polyvinyl chloride (PVC) with 0.020-slotted screen from 4 to 14 feet bgs. The wellheads will be protected at the

surface with 24-inch square flush-mount vaults set in a concrete pad. The extraction wells will be connected with 4-inch diameter PVC in trenches, leading to the equipment trailer to be located on the far southwest corner of the property.
A 1-inch diameter pipe consisting of schedule 40 PVC will be laid in the trench between the SVE trailer and SVE-3 for potential use in discharging condensate if significant condensate is produced by the SVE and this becomes an issue. Based on pilot testing, significant condensate production is not anticipated; however, discharge of excess condensate would be under permit to the City of Wauwatosa, and would require excavating and connection to the sanitary lateral located near SVE-3. In addition, tracer wire will be laid in all of the connection trenching for future accurate locating purposes.

The proposed layout of the system is shown on **Figure 5**. The extraction well and sub-grade piping construction details are depicted on **Figures 6** and **7**.

3.1.3 SVE Mechanical System

Below is a summary of system equipment. A process and instrumentation diagram is included as **Figure 8** and an instrumentation legend is included as **Figure 9**.

- Bi-lobe vacuum blower capable of providing up to 857 acfm of air and applying up to approximately 15 inHg vacuum.
    - The blower will be powered by a 20Hp 3-phase, electric motor.
    - The operation of the motor shall be controlled by a variable frequency drive (VFD).

- A vacuum relief valve assembly shall be installed to protect the blower by automatically reducing the applied vacuum at the blower.

- Vacuum dilution valve assembly with an intake air filter installed between the moisture separator and vacuum pump to reduce the vacuum applied to the recovery well network.

- A particulate air filter installed in the process plumbing between the moisture separator and vacuum extraction pump to protect the vacuum extraction pump from suspended particles in the inlet air flow.

- A moisture separator to remove and contain moisture from the air stream prior to the vacuum extraction pump.
    - A float tree assembly will be installed on the moisture separator to automatically pump out water after sufficient moisture accumulation.

- A self-priming transfer pump shall be installed to remove liquid from the moisture separator without reducing the vacuum applied by the vacuum extraction pump. Initially, a 300-gallon plastic tote will be provided to hold any excess liquid (moisture) collected by the system. Moisture will likely contain contaminants, so any liquid collected will be analyzed by a Wisconsin Certified Analytical Laboratory and managed according to State regulations.

- The remediation system controls shall include the following.
    - A 24 hour timer
    - Low vacuum switch
    - High SVE exhaust temperature switch

- The remediation system instrumentation shall include the following.
    - An airflow meter (standard cubic feet per minute)
    - Vacuum gauges at each extraction leg on the manifold (inHg)
    - Vacuum gauge at the blower (inHg)
    - Temperate gauge on the SVE exhaust (°F)
    - High SVE exhaust temperature switch

- System Telemetry will be utilized to monitor system operating conditions and receive alerts.

- Air Permitting
    - Data collected during the SVE pilot study indicated an air permit will not be required.
    - A table depicting the estimated mass removal was provided with the Pilot Study Report.
    - The estimates provided above are conservatively estimated, and represent worst-case scenarios. Mass emissions data collected following system startup will be evaluated to confirm air permitting requirements.

- Electrical Service
    - Power will be supplied to the system through a stand-alone power supply from the local power company.
        - The anticipated power supply is 3 phase, 4-wire, 240 volt service.
    - A licensed electrician will perform the work necessary to prepare the Site to receive a power drop from the local power company.
    - Upon installation, the electrical service will be inspected by the City of Wauwatosa and the local power provider, as required.

- The system equipment will be housed in a trailer located west of the southern storage building on the property.

- SVE Plumbing Connections
    - The conveyance piping will be plumbed to a manifold outside the remediation unit and the manifold will be connected to the vacuum pump.
    - Each branch from the SVE manifold will be equipped with a vacuum gauge and valve to control air-flow from each extraction well.

- Commissioning and Initial Startup
    - Once the remediation units have been delivered, all plumbing connections have been made, and electrical service has been established, the system will be started.
    - The objectives of the startup and optimization phase will be to:
        - confirm the systems have been constructed as designed;
        - confirm the equipment operates as specified; and
        - gather and evaluate initial operating data.

3.2 SVE System Operation and Maintenance (O&M)

Initially, the SVE system will be operated for a period of one (1) year. After the first year of operation, the need for continued operation will be evaluated. The SVE system will be shut off for at least 30 days to allow the subsurface to reach equilibrium and soil and sub-slab vapor samples will be collected to determine the concentrations of residual impacts. If additional remediation is warranted, a change order will be issued to cover the anticipated duration of system operation.

Routine and periodic O&M of the SVE system will be required. O&M activities will include the following:

- Address system shutdowns or operational issues;
- Record operational parameters and vapor concentrations to evaluate efficiency:
    - Effluent CVOC vapor concentration by sample collection in vacuum canisters;
    - Total system run time;
    - System vacuum;
    - Vacuum at each wellhead;
    - Vacuum at monitoring points;
    - Flow rate; and
    - Exhaust temperature.
- Inspect, maintain, and/or repair the following components as needed and recommended by the manufacturers:
    - Blower belts and pulleys;
    - Blower inlet filter;
    - Blower motor bearings and oil level;
    - System enclosure exhaust fan;
    - Moisture separator tank and float switches;
    - Vacuum bypass valve;
    - Moisture separator dilution valve;
    - Exhaust muffler; and
    - Electrical power phase converter.

EnviroForensics will prepare and submit an Operation and Maintenance Plan to WDNR in accordance with Wisconsin Administrative Code (WAC) Chapter NR 724.13 after the system has been installed.

3.3 SVE Performance Monitoring

The effectiveness of the SVE system is evaluated periodically by monitoring the subsurface vacuum influence and air emissions of total volatile organic compounds (VOCs). These activities are summarized below.

Samples of the SVE system emissions will be collected from the effluent piping and analyzed for VOCs to calculate mass removal rates and cumulative mass removed and to determine

operational changes to optimize system performance. Testing is also required to determine whether emissions treatment is required to stay below permitting thresholds. The emissions testing schedule required under WAC Chapter 419.07 is as follows:

- Once each day for the first 3 days of operation;
- Weekly for the next 3 weeks; and
- Monthly thereafter.

The effluent samples will be collected in 1-liter vacuum canisters at a rate of 200 milliliters per minute and submitted to a laboratory for analysis for PCE and related compounds. The first two samples, collected on days 1 and 2 of operation, will be analyzed on a rush timeframe to avoid delays in meeting the emissions thresholds.

An annual outdoor air sample is required to evaluate ambient air quality and the need for emissions treatment to meet the ambient air standard. The sample will be collected from a location downwind of the exhaust stack at the time of sampling. The ambient air sample will be collected following the first day of continuous system operation. This is likely the worse case scenario since subsurface vapor concentrations collected by the SVE system will be reduced over time. One (1) 24-hour sample will be collected over a 24-hour period using a 6-liter vacuum canister and shipped to a laboratory for analysis of total VOCs.

During Site visits to collect effluent air samples, negative pressures will be measured in the existing vapor monitoring points using a manometer. Two additional permanent sub-slab vapor monitoring points will be installed within the Site building to measure the negative pressure field extension beneath the building slab. Negative pressure will also be measured periodically at existing sub-slab vapor monitoring points located inside the adjacent commercial building to the south.

3.4 Confirmation Sampling

Once performance monitoring data indicates a significantly diminished mass removal rate, the SVE system will be shut down and soil samples will be collected to confirm the effectiveness of the SVE remedy. Up to twelve (12) soil samples will be collected from the four (4) locations shown on **Figure 5** using direct-push soil boring methods. The samples will be submitted to a laboratory for analysis of CVOCs according to US EPA Test Method 8260.

The vapor intrusion pathway will also be re-evaluated after system shutdown. Three (3) sub-slab vapor samples will be collected from the Site building and two (2) from the adjacent commercial building to the south and analyzed for CVOCs.

3.5 Proposed Implementation Schedule

The SVE mechanical system is available immediately for delivery to the Site. Installation of the extraction wells and conveyance piping can be completed within 60 days of WDNR approval of this design report. The timing of system startup will depend on the availability of electrical service; however, it is anticipated that startup will occur within 90 days of WDNR approval of this design report. Construction documentation will be submitted within 60 days after the remedial system construction is completed. Operation and monitoring reports will be submitted on a semi-annual basis, as required.

Initially, one (1) year of continuous SVE system operation is planned. Mass removal rates will be evaluated after the first year of operation to determine whether additional operation is warranted. EnviroForensics will then provide recommendations for system shutdown or a proposed timeframe for continued operation, maintenance, and monitoring.

4.0 COST ESTIMATES

Costs are based on an initial estimated SVE system operating life of one (1) year. WDNR Form 4400-214D has been completed to allow budget tracking of this work and is included in **Appendix B**. Subcontracted services including construction, SVE system rental, laboratory expenses, drilling expenses, and utility service charges are actual charges with no markup. The costs are subdivided into these main work categories:

- SVE system engineering design, specifications, and cost estimating;
- Subcontractor upgrades to the SVE system to accommodate site specific needs such as sound insulation, telemetry hardware, and system controls;
- Costs to install SVE system infrastructure such as SVE extraction wells, connective; piping and trenching, electrical connections, and telemetry and make connections to the SVE mechanical system. Initial startup and preparation of O&M Plan;
- SVE system rental fees and SVE system operation and maintenance costs per month carried out for 12 months;
- Data analysis and bi-annual performance reporting;
- Year end confirmation sampling; and
- Project coordination and management during design engineering, system installation, and carrying through one year of system operation, maintenance, and reporting.

The SVE system costs including design, installation, O&M, monitoring, and reporting through one (1) year of operation are summarized below. Detailed cost break down sheets showing special DERF rates are provided in **Appendix C**.

Engineered Plans and Specifications

This work effort has been performed and includes the production of design specifications included in this document, and documents utilized to obtain reasonable cost estimates for planning purposes. The work performed represents efforts to reduce construction costs where feasible, reduce the time necessary to achieve remedial goals, to keep Site disruption to a minimum, and reduce future annoyance issues with neighbors.

These efforts have resulted in the following consultant cost: $19,591.00

SVE System Modifications and Infrastructure Installation

✓	Subcontractor modifications to existing SVE system:	$11,920.00
✓	Consultant Oversight, O&M Plan, and System Connections Cost:	$20,173.20
✓	Driller/Installation Subcontractor Cost:	$38,840.00
✓	Private Utility Locate:	$450.00
✓	Electrical Service and Connections:	$8,000.00
	Subtotal Cost:	$79,383.20

SVE System Rental and O&M (one year)

Includes seventeen Site visits to collect system vapor effluent samples, measure negative pressures within the sub-surface and perform routine maintenance such as belt tightening or replacement, filter replacements, system adjustments, and possible testing and batch disposal of condensate. Two additional Site visits have been planned to address unexpected system malfunctions. Labor also includes professional services to diagnose and correct system for optimal performance.

✓	Consultant Labor:	$16,520.00
✓	SVE Equipment Rental:	$26,400.00
✓	Electrical and Telemetry Costs:	$10,400.00
✓	Subcontractor Costs:	$2,510.00
✓	Consultant Miscellaneous Direct Costs:	$4,310.80
	Subtotal Cost:	$60,140.80

Data Analysis and Bi-annual Performance Reporting

Work effort includes assembling of field data collected, analysis of system performance over time, production of bi-annual performance reports, and production of off-site results reports for sampling performed on adjacent commercial property to the south.

Consultant Cost:	$9,157.30

Year End Confirmation Sampling

Work effort includes collection of soil and sub-slab soil vapor samples to assess concentrations of residual contaminants after one (1) year of SVE system operation, evaluation of data, and recommendations for future Site remedial needs with associated cost estimates. Recommendations could include either further Site remedial efforts, or preparation of closure documentation and any required continued obligations.

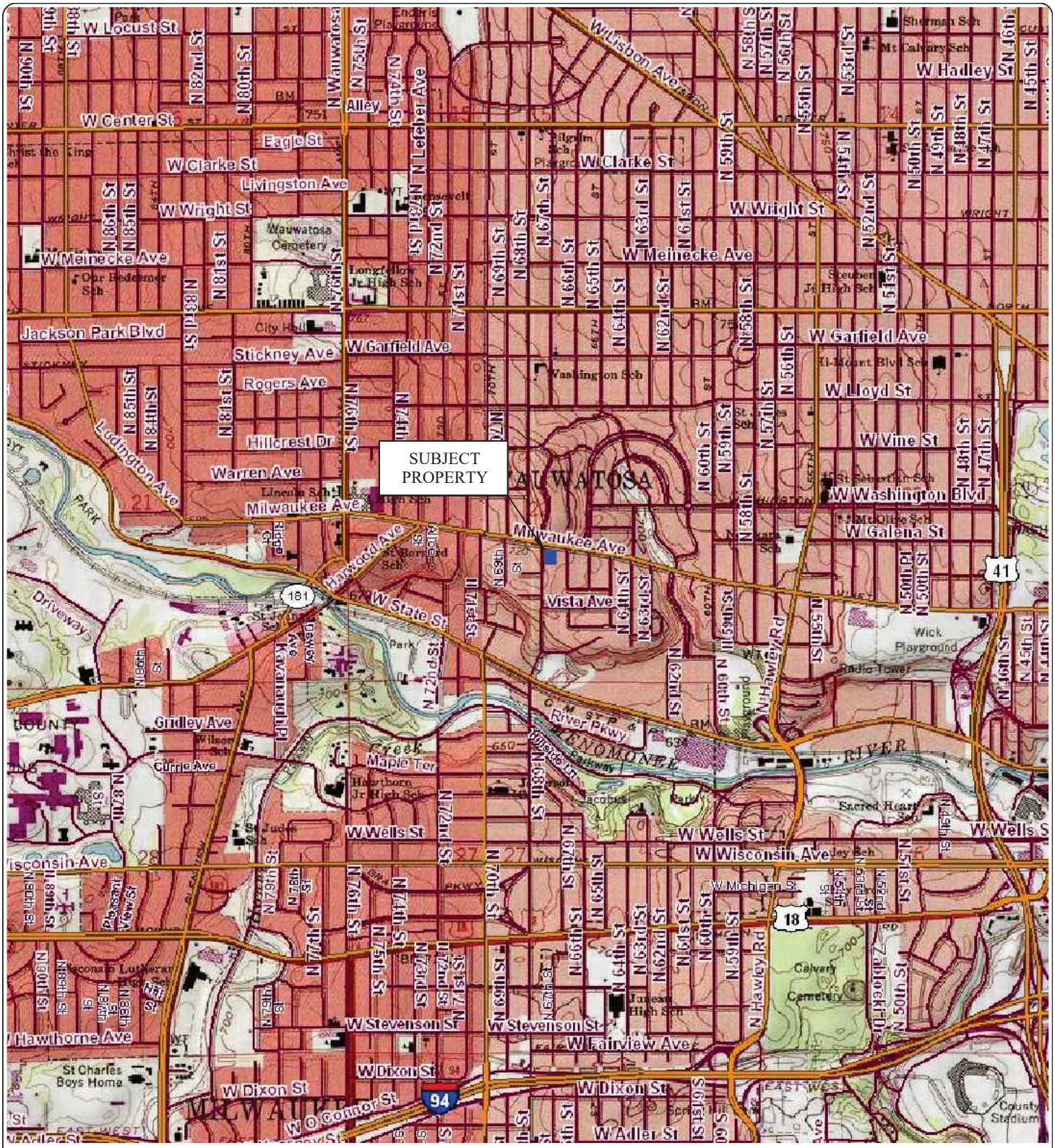
✓ Consultant Labor and Direct Cost:		$8,408.85
✓ Subcontractor and Laboratory Cost:		$4,850.00
	Subtotal Cost	$13,258.85

Project Management

Project management includes time needed to manage the progress of Site work, schedule resources, manage budgets, communicate with project stakeholders, and address miscellaneous project issues as they arise. This cost begins with the initial design work and is projected through one year of system operation, maintenance and reporting.

	Consultant Cost	$12,016.80
The total estimated project cost is:		**$193,547.95**

FIGURES



Scale 1:24,000

1 1/2 0 1 Mile

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

1 .5 0 1 Kilometer

N

Source: US Geological Survey, Milwaukee, Wisconsin Quadrangle, 2007

No.	Date	Revision	Approved

ENVIRO forensics

ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.

602 N. Capitol Ave., Ste 210 • Indianapolis, IN 46204

EnviroForensics.com

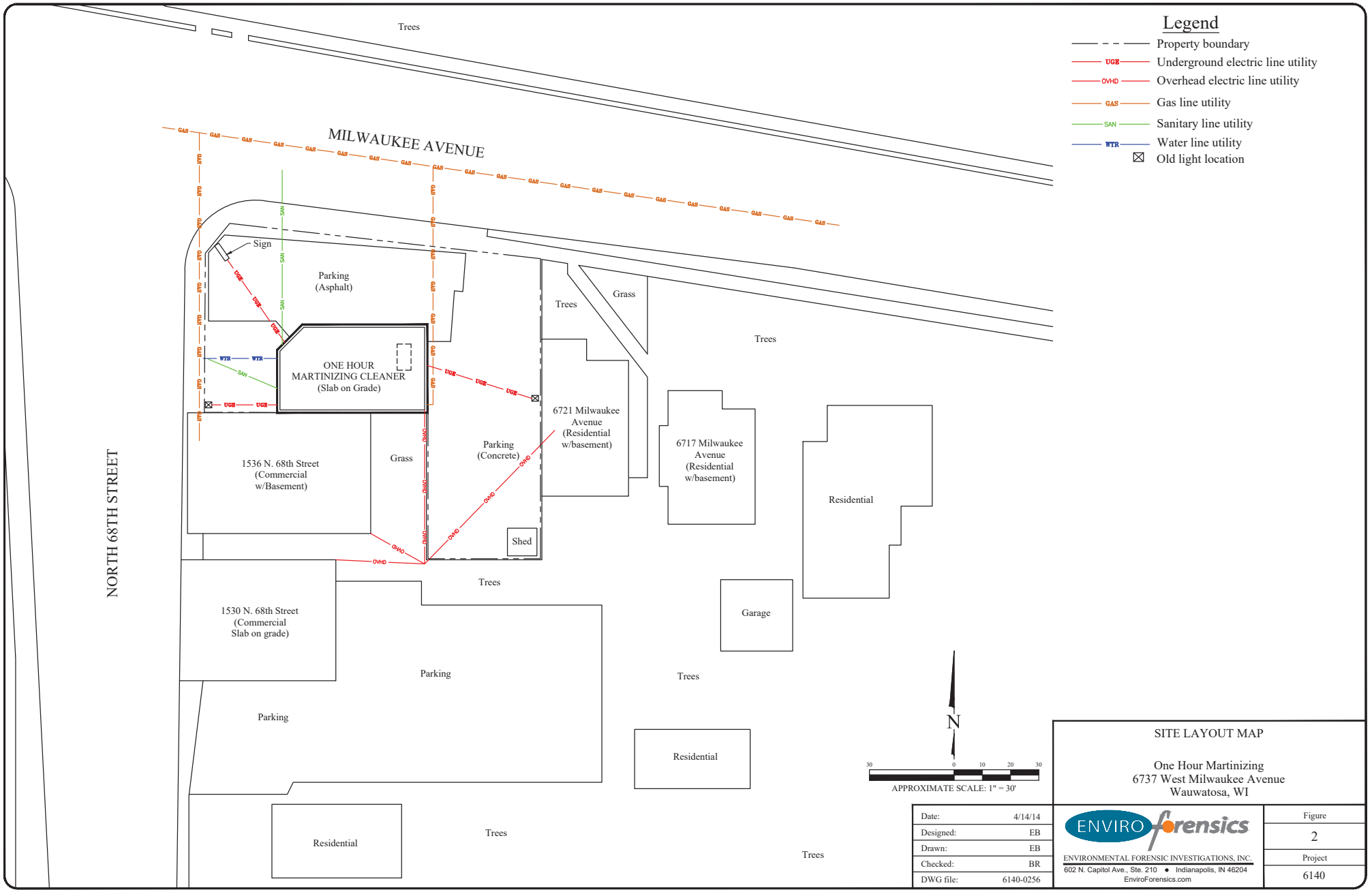
Date:	8/9/13
Designed:	MMM
Drawn:	MMM
Checked:	BK
DWG file:	66372-11

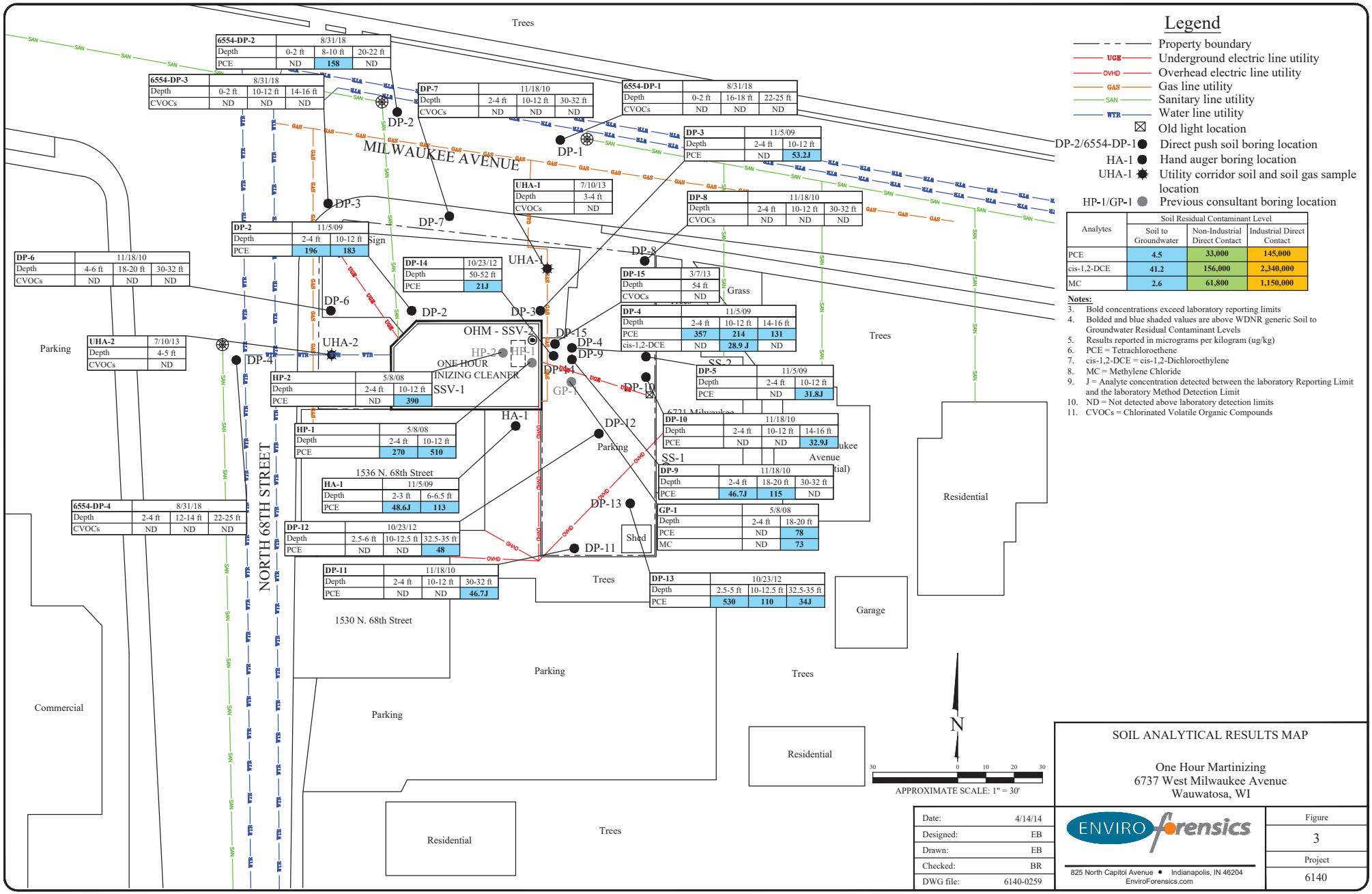
SITE LOCATION MAP

One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure
1
Project
6140

K:\Drawings\6140 Wauwatosa-OHM\Drawing\66372-11.dwg


Legend
Property boundary
Underground electric line utility
Overhead electric line utility
Gas line utility
Sanitary line utility
Water line utility
Old light location
MILWAUKEE AVENUE
NORTH 68TH STREET
Trees
Sign
Parking
(Asphalt)
ONE HOUR
MARTINIZING CLEANER
(Slab on Grade)
Grass
Trees
Trees
6721 Milwaukee
Avenue
(Residential
w/basement)
6717 Milwaukee
Avenue
(Residential
w/basement)
Residential
1536 N. 68th Street
(Commercial
w/Basement)
Grass
Parking
(Concrete)
Shed
Trees
1530 N. 68th Street
(Commercial
Slab on grade)
Garage
Parking
Trees
Parking
Residential
Residential
Trees
Trees
N
30 0 10 20 30
APPROXIMATE SCALE: 1" = 30'
SITE LAYOUT MAP
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI
Date: 4/14/14
Designed: EB
Drawn: EB
Checked: BR
DWG file: 6140-0256
ENVIRO forensics
ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
602 N. Capitol Ave., Ste. 210 ◆ Indianapolis, IN 46204
EnviroForensics.com
Figure
2
Project
6140



6554-DP-2	8/31/18		
Depth	0-2 ft	8-10 ft	20-22 ft
PCE	ND	**158**	ND

6554-DP-3	8/31/18		
Depth	0-2 ft	10-12 ft	14-16 ft
CVOCs	ND	ND	ND

DP-7	11/18/10		
Depth	2-4 ft	10-12 ft	30-32 ft
CVOCs	ND	ND	ND

6554-DP-1	8/31/18		
Depth	0-2 ft	16-18 ft	22-25 ft
CVOCs	ND	ND	ND

DP-3	11/5/09	
Depth	2-4 ft	10-12 ft
PCE	ND	**53.2J**

UHA-1	7/10/13
Depth	3-4 ft
CVOCs	ND

DP-8	11/18/10		
Depth	2-4 ft	10-12 ft	30-32 ft
CVOCs	ND	ND	ND

DP-2	11/5/09	
Depth	2-4 ft	10-12 ft
PCE	**196**	**183**

DP-14	10/23/12
Depth	50-52 ft
PCE	**21J**

DP-15	3/7/13
Depth	54 ft
CVOCs	ND

DP-6	11/18/10		
Depth	4-6 ft	18-20 ft	30-32 ft
CVOCs	ND	ND	ND

DP-4	11/5/09		
Depth	2-4 ft	10-12 ft	14-16 ft
PCE	**357**	**214**	**131**
cis-1,2-DCE	ND	**28.9 J**	ND

UHA-2	7/10/13
Depth	4-5 ft
CVOCs	ND

DP-5	11/5/09	
Depth	2-4 ft	10-12 ft
PCE	ND	**31.8J**

HP-2	5/8/08	
Depth	2-4 ft	10-12 ft
PCE	ND	**390**

DP-10	11/18/10		
Depth	2-4 ft	10-12 ft	14-16 ft
PCE	ND	ND	**32.9J**

HP-1	5/8/08	
Depth	2-4 ft	10-12 ft
PCE	**270**	**510**

DP-9	11/18/10		
Depth	2-4 ft	18-20 ft	30-32 ft
PCE	**46.7J**	**115**	ND

HA-1	11/5/09	
Depth	2-3 ft	6-6.5 ft
PCE	**48.6J**	**113**

GP-1	5/8/08	
Depth	2-4 ft	18-20 ft
PCE	ND	**78**
MC	ND	**73**

6554-DP-4	8/31/18		
Depth	2-4 ft	12-14 ft	22-25 ft
CVOCs	ND	ND	ND

DP-12	10/23/12		
Depth	2.5-6 ft	10-12.5 ft	32.5-35 ft
PCE	ND	ND	**48**

DP-11	11/18/10		
Depth	2-4 ft	10-12 ft	30-32 ft
PCE	ND	ND	**46.7J**

DP-13	10/23/12		
Depth	2.5-5 ft	10-12.5 ft	32.5-35 ft
PCE	**530**	**110**	**34J**

Legend

- Property boundary
- Underground electric line utility (UGH)
- Overhead electric line utility (OVHD)
- Gas line utility (GAS)
- Sanitary line utility (SAN)
- Water line utility (WTR)
- Old light location
- DP-2/6554-DP-1 Direct push soil boring location
- HA-1 Hand auger boring location
- UHA-1 Utility corridor soil and soil gas sample location
- HP-1/GP-1 Previous consultant boring location

Analytes	Soil Residual Contaminant Level		
	Soil to Groundwater	Non-Industrial Direct Contact	Industrial Direct Contact
PCE	**4.5**	**33,000**	**145,000**
cis-1,2-DCE	**41.2**	**156,000**	**2,340,000**
MC	**2.6**	**61,800**	**1,150,000**

Notes:

3. Bold concentrations exceed laboratory reporting limits
4. Bolded and blue shaded values are above WDNR generic Soil to Groundwater Residual Contaminant Levels
5. Results reported in micrograms per kilogram (ug/kg)
6. PCE = Tetrachloroethene
7. cis-1,2-DCE = cis-1,2-Dichloroethylene
8. MC = Methylene Chloride
9. J = Analyte concentration detected between the laboratory Reporting Limit and the laboratory Method Detection Limit
10. ND = Not detected above laboratory detection limits
11. CVOCs = Chlorinated Volatile Organic Compounds

SOIL ANALYTICAL RESULTS MAP

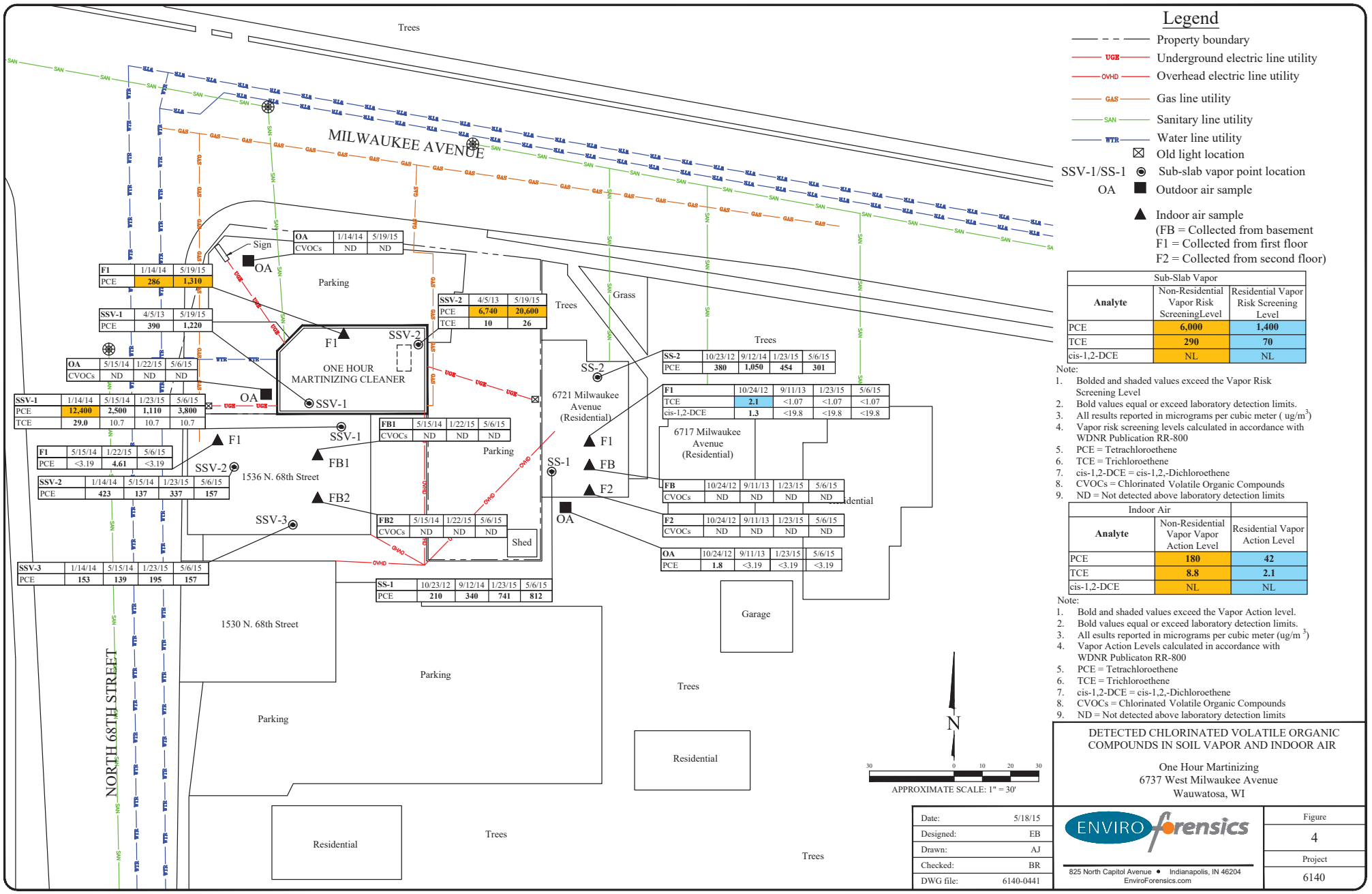
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Date:	4/14/14
Designed:	EB
Drawn:	EB
Checked:	BR
DWG file:	6140-0259

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure 3

Project 6140



OA	1/14/14	5/19/15
CVOCs	ND	ND

F1	1/14/14	5/19/15
PCE	286	1,310

SSV-1	4/5/13	5/19/15
PCE	390	1,220

SSV-2	4/5/13	5/19/15
PCE	6,740	20,600
TCE	10	26

OA	5/15/14	1/22/15	5/6/15
CVOCs	ND	ND	ND

SSV-1	1/14/14	5/15/14	1/23/15	5/6/15
PCE	12,400	2,500	1,110	3,800
TCE	29.0	10.7	10.7	10.7

F1	5/15/14	1/22/15	5/6/15
PCE	<3.19	4.61	<3.19

SSV-2	1/14/14	5/15/14	1/23/15	5/6/15
PCE	423	137	337	157

SSV-3	1/14/14	5/15/14	1/23/15	5/6/15
PCE	153	139	195	157

FB1	5/15/14	1/22/15	5/6/15
CVOCs	ND	ND	ND

FB2	5/15/14	1/22/15	5/6/15
CVOCs	ND	ND	ND

SS-1	10/23/12	9/12/14	1/23/15	5/6/15
PCE	210	340	741	812

SS-2	10/23/12	9/12/14	1/23/15	5/6/15
PCE	380	1,050	454	301

F1	10/24/12	9/11/13	1/23/15	5/6/15
TCE	2.1	<1.07	<1.07	<1.07
cis-1,2-DCE	1.3	<19.8	<19.8	<19.8

FB	10/24/12	9/11/13	1/23/15	5/6/15
CVOCs	ND	ND	ND	ND

F2	10/24/12	9/11/13	1/23/15	5/6/15
CVOCs	ND	ND	ND	ND

OA	10/24/12	9/11/13	1/23/15	5/6/15
PCE	1.8	<3.19	<3.19	<3.19

Legend

- Property boundary
- UGE — Underground electric line utility
- OVHD — Overhead electric line utility
- GAS — Gas line utility
- SAN — Sanitary line utility
- WTR — Water line utility
- Old light location
- SSV-1/SS-1 — Sub-slab vapor point location
- OA — Outdoor air sample
- Indoor air sample (FB = Collected from basement, F1 = Collected from first floor, F2 = Collected from second floor)

Sub-Slab Vapor		
Analyte	Non-Residential Vapor Risk ScreeningLevel	Residential Vapor Risk Screening Level
PCE	6,000	1,400
TCE	290	70
cis-1,2-DCE	NL	NL

Note:
1. Bolded and shaded values exceed the Vapor Risk Screening Level
2. Bold values equal or exceed laboratory detection limits.
3. All results reported in micrograms per cubic meter (ug/m^3)
4. Vapor risk screening levels calculated in accordance with WDNR Publication RR-800
5. PCE = Tetrachloroethene
6. TCE = Trichloroethene
7. cis-1,2-DCE = cis-1,2,-Dichloroethene
8. CVOCs = Chlorinated Volatile Organic Compounds
9. ND = Not detected above laboratory detection limits

Indoor Air		
Analyte	Non-Residential Vapor Vapor Action Level	Residential Vapor Action Level
PCE	180	42
TCE	8.8	2.1
cis-1,2-DCE	NL	NL

Note:
1. Bold and shaded values exceed the Vapor Action level.
2. Bold values equal or exceed laboratory detection limits.
3. All esults reported in micrograms per cubic meter (ug/m ^{3})
4. Vapor Action Levels calculated in accordance with WDNR Publicaton RR-800
5. PCE = Tetrachloroethene
6. TCE = Trichloroethene
7. cis-1,2-DCE = cis-1,2,-Dichloroethene
8. CVOCs = Chlorinated Volatile Organic Compounds
9. ND = Not detected above laboratory detection limits

DETECTED CHLORINATED VOLATILE ORGANIC COMPOUNDS IN SOIL VAPOR AND INDOOR AIR

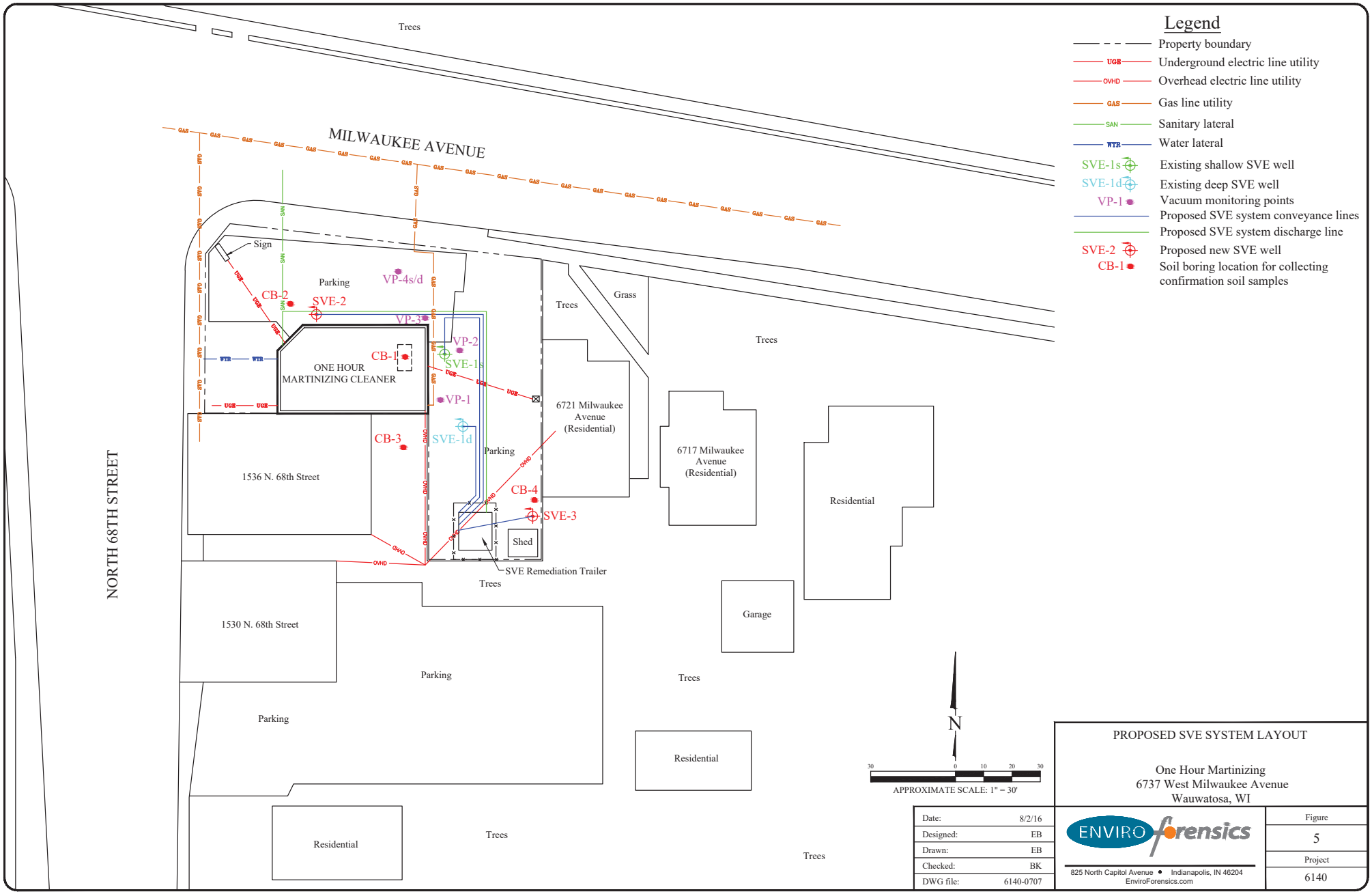
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

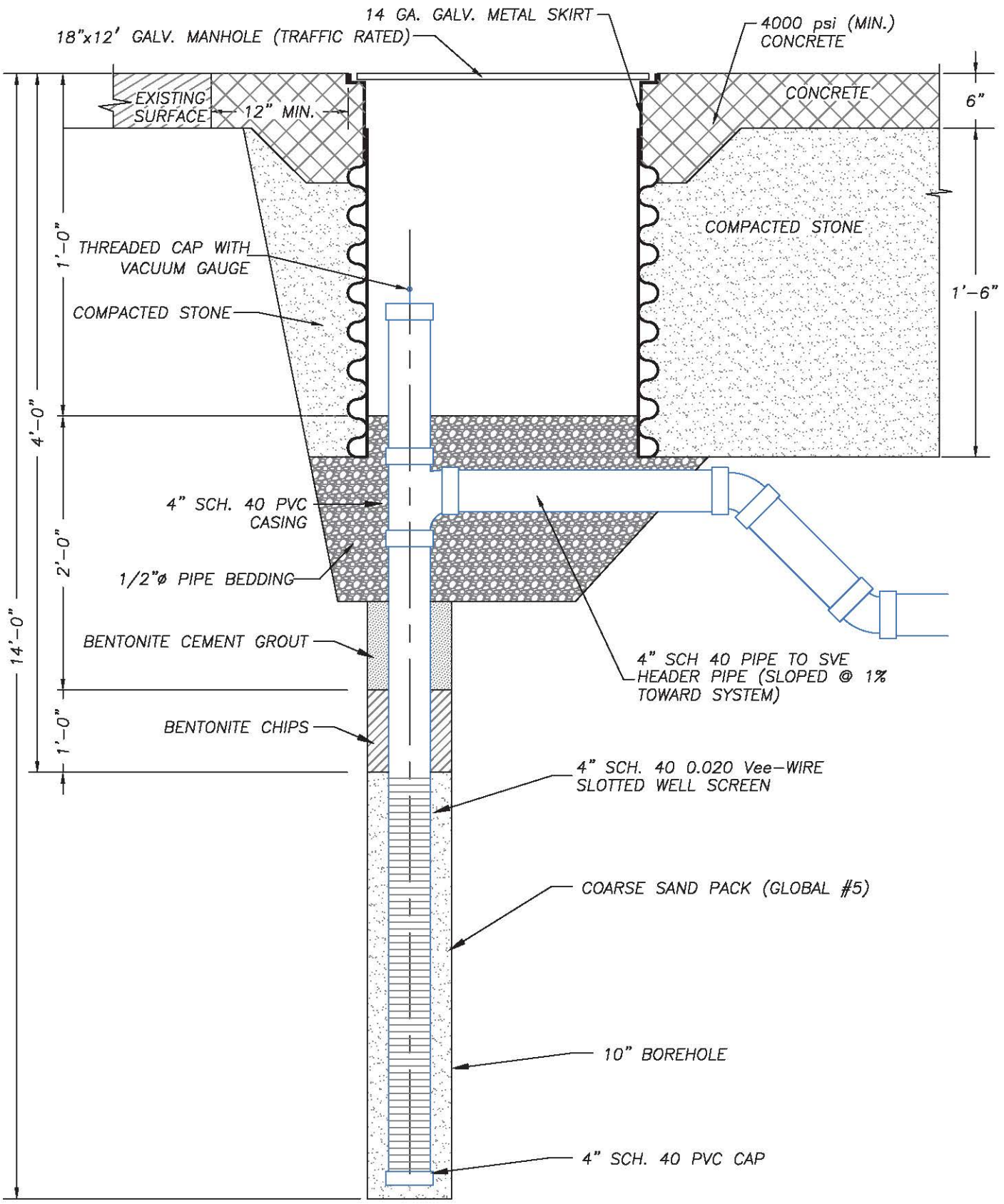
Date:	5/18/15
Designed:	EB
Drawn:	AJ
Checked:	BR
DWG file:	6140-0441

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure 4

Project 6140


Trees
MILWAUKEE AVENUE
NORTH 68TH STREET
Sign
Parking
VP-4s/d
CB-2
SVE-2
VP-3
VP-2
CB-1
SVE-1s
ONE HOUR
MARTINIZING CLEANER
VP-1
CB-3
SVE-1d
1536 N. 68th Street
Parking
CB-4
SVE-3
Shed
SVE Remediation Trailer
Trees
Grass
Trees
6721 Milwaukee
Avenue
(Residential)
6717 Milwaukee
Avenue
(Residential)
Residential
Garage
1530 N. 68th Street
Parking
Trees
Parking
Residential
Residential
Trees
Trees
Legend
Property boundary
Underground electric line utility
Overhead electric line utility
Gas line utility
Sanitary lateral
Water lateral
SVE-1s Existing shallow SVE well
SVE-1d Existing deep SVE well
VP-1 Vacuum monitoring points
Proposed SVE system conveyance lines
Proposed SVE system discharge line
SVE-2 Proposed new SVE well
CB-1 Soil boring location for collecting confirmation soil samples
N
30 0 10 20 30
APPROXIMATE SCALE: 1" = 30'
PROPOSED SVE SYSTEM LAYOUT
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI
Date: 8/2/16
Designed: EB
Drawn: EB
Checked: BK
DWG file: 6140-0707
ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com
Figure
5
Project
6140



No.	Date	Revision	Approved

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Date:	8/28/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6140-0711

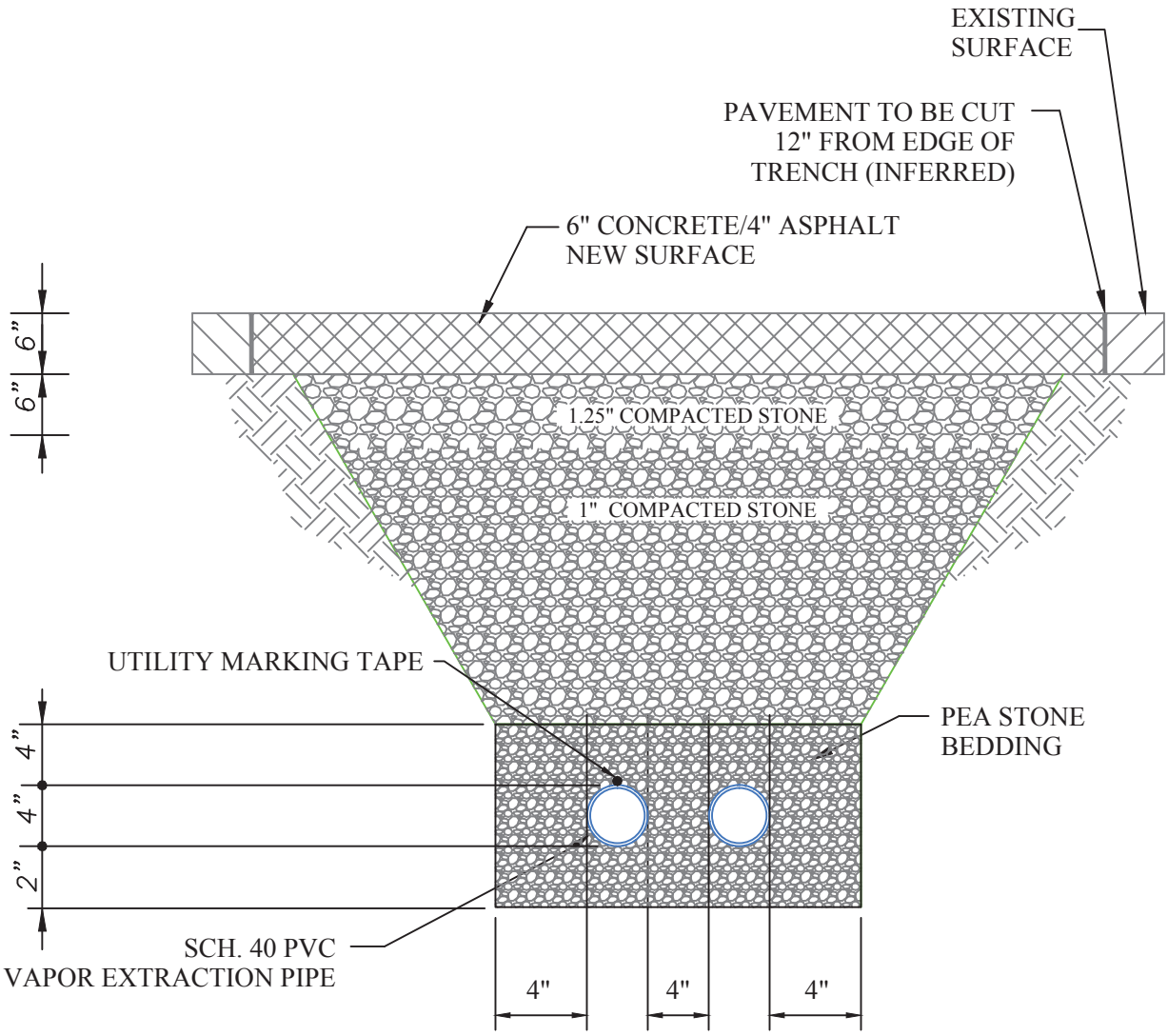
SVE EXTERIOR WELLHEAD CONNECTION DIAGRAM

One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure 6

Project 6140

IN PAVED AREA



NOTES:

- TRENCH TO BE BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND PROTECTION OF OTHER UTILITIES PER OSHA REGULATIONS.
- DISPOSE OF EXCAVATED MATERIAL PER STATE AND FEDERAL REGULATIONS.

No.	Date	Revision	Approved

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

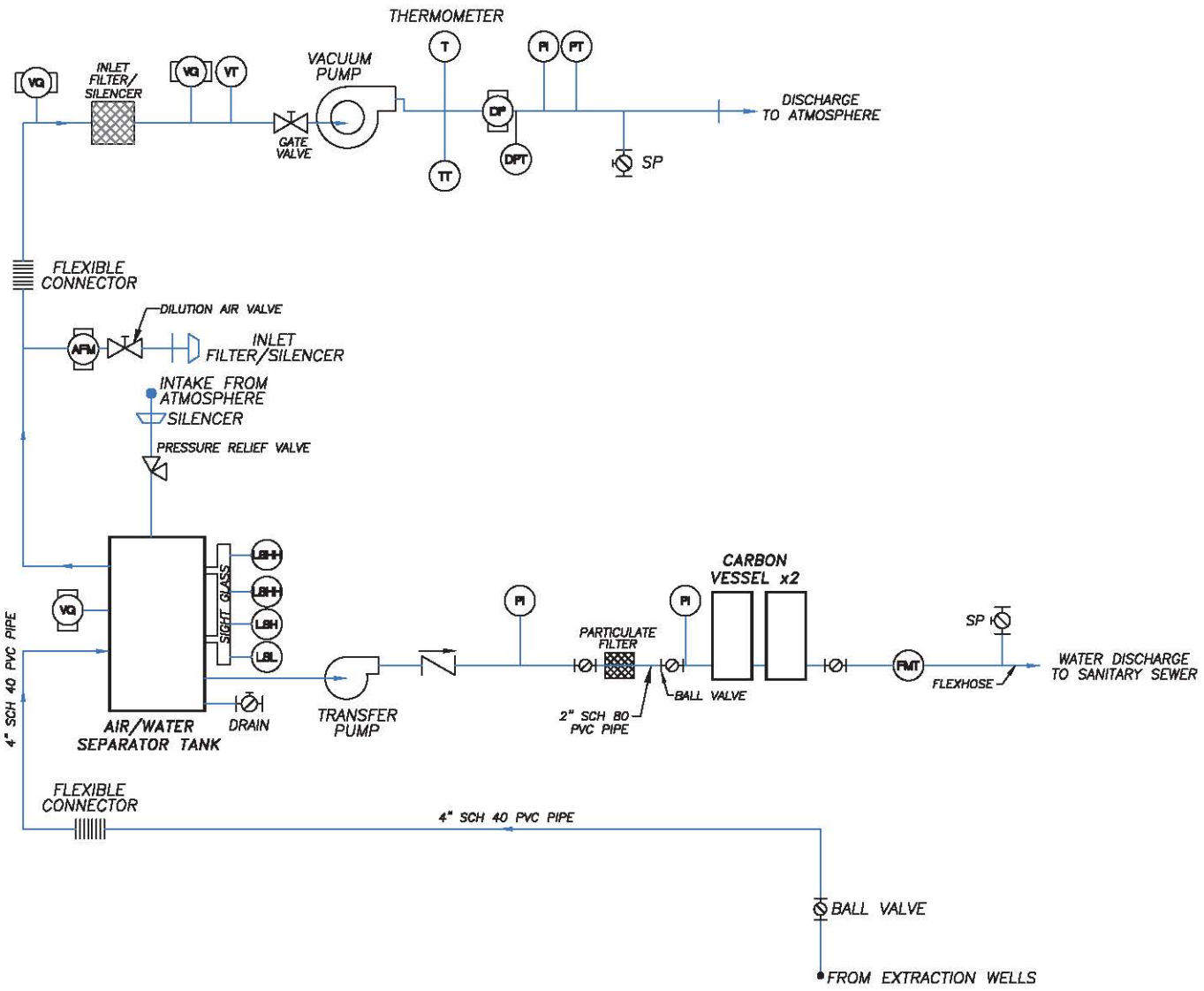
Date:	8/28/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6140-0711

TYPICAL PIPING TRENCH DETAIL

One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure 7

Project 6140



No.	Date	Revision	Approved

ENVIRO forensics

825 North Capitol Avenue ◆ Indianapolis, IN 46204
EnviroForensics.com

Date:	9/26/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6140-0741

SVE SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

Martinizing Dry Cleaning
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure
8
Project
6140

VALVE AND PIPING SYMBOLS

- GATE VALVE
- SOLENOID VALVE
- CHECK VALVE
- BALL VALVE
- SAMPLING PORT
- EXHAUST TO ATMOSPHERE (INSIDE)
- EXHAUST TO ATMOSPHERE (OUTSIDE)
- PRESSURE RELIEF VALVE
- VACUUM GAUGE

ABBREVIATIONS

DP	DIFFERENTIAL PRESSURE
DO	DISSOLVED OXYGEN
FC	FAIL CLOSED
FI	FAIL INDETERMINATE
FL	FAIL LOCKED
FO	FAIL OPEN
FQ	FAIL QUANTIFIER
HOA	HAND–OFF–AUTOMATIC
HS	HAND SWITCH
IL	INDICATOR LIGHT
I/I	CURRENT–TO–CURRENT
I/P	CURRENT–TO–PNEUMATIC
KC	PROGRAM CONTROLLER
LC	LEVEL CONTROLLER
LEL	LOWER EXPLOSIVE LIMIT
LR	LOCAL–REMOTE
LS	LEVEL SWITCH
LSHH, LSL, LSH	LIQUID SWITCH HIGH / LOW
M	MOTOR
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
P	PRESSURE
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
PRV	PRESSURE RELIEF VALVE
PSH	PRESSURE SWITCH – HIGH
SG	SIGHT GLASS
SP	SAMPLING PORT
UA	UNIVERSAL ALARM
FMT	FLOW METER TOTALIZER
AFM	AIR FLOW METER

EQUIPMENT SYMBOLS

- PUMP
- BLOWER

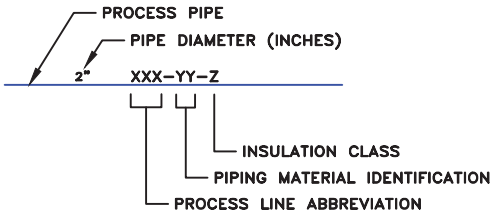
LINE SYMBOLS

- PROCESS PIPES OR CHANNELS
- ELECTRIC SIGNAL
- COMPRESSED AIR LINE

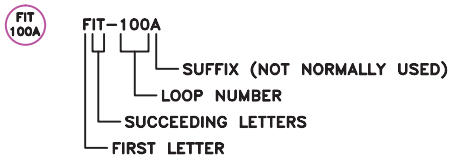
GENERAL INSTRUMENT SYMBOLS

- LOCALLY MOUNTED
- PANEL MOUNTED
- REAR–OF–PANEL MOUNTED
- INTERLOCK (I)
- PURGE (P)

PROCESS PIPING IDENTIFICATION



INSTRUMENT IDENTIFICATION



No.	Date	Revision	Approved

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Date:	9/26/18
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	6140-0741

PROCESS AND INSTRUMENTATION LEGEND
Martinizing Dry Cleaning
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure 9
Project 6140

APPENDIX A

SVE Pilot Test Documentation

SOIL VAPOR EXTRACTION PILOT STUDY REPORT

ONE HOUR MARTINIZING CLEANERS
6737 WEST MILWAUKEE AVENUE
WAUWATOSA, WISCONSIN 53213
WDNR BRRTS# 02-41-551923

September 15, 2017

Prepared For:

OHM Holdings, LLC
W229N2494 County Road F
Waukesha, Wisconsin 53186

Prepared By:

Environmental Forensic Investigations, Inc.
N16 W23390 Stone Ridge Drive, Suite G
Waukesha, WI 53188
Phone: (262) 290-4001
www.enviroforensics.com

Collin Martin, PE, CHMM
Senior Engineer

Wayne Fassbender, PG, PMP
Senior Project Manager

TABLE OF CONTENTS

CHARTS

APPENDICES

EXECUTIVE SUMMARY

Environmental Forensic Investigations, Inc. (EnviroForensics) has prepared this *Soil Vapor Extraction Pilot Study Report* on behalf of OHM Holdings, LLC for the One Hour Martinizing (OHM) facility located at 6737 West Milwaukee Avenue in Wauwatosa, Wisconsin (Site). The Site operates as a drop off location for clothes dry cleaned elsewhere.

A soil vapor extraction (SVE) pilot study has been performed to identify the feasibility of SVE for remediation of unsaturated soils contaminated with dry cleaning solvents. Two depth zones having distinct lithology were tested separately. These zones are referred to as the shallow and deep soil zones. The shallow soil zone (up to six feet below ground surface) contains more clay content than the soil below this zone, which has more sand and gravel. The stated objectives upon implementation were to:

- Measure vacuum conditions separately in the shallow and deep zones via monitoring points while inducing a vacuum with SVE extraction wells;
- Assess the effectiveness of the pilot SVE system by monitoring changes in subsurface vacuum over the duration of the pilot test; and
- Determine radius of influence values for the SVE extraction wells.

The pilot study included installation of two (2) SVE extraction wells and four (4) vacuum monitoring points to facilitate pilot testing. SVE pilot testing was performed separately in the shallow and deep zones, with applied vacuum incrementally increased during testing to gauge subsurface response to applied vacuum. Applied vacuums, subsurface vacuums, extraction flow rates, and extraction air contaminant concentrations were monitored during testing. Existing nested soil gas sampling points were also measured to gauge vacuum influence.

The results of the pilot study indicate that SVE is a viable remedial alternative for unsaturated soils in both zones at the Site. It may also provide additional benefit for mitigation of vapor intrusion at the Site building and neighboring commercial property during implementation, but would require multiple SVE extraction points to achieve this goal.

1.0 INTRODUCTION

Environmental Forensic Investigations, Inc. (EnviroForensics) has prepared this *Soil Vapor Extraction Pilot Study Report* on behalf of OHM Holdings, LLC for the One Hour Martinizing (OHM) facility located at 6737 West Milwaukee Avenue in Wauwatosa, Wisconsin (Site). The general Site location is depicted on **Figure 1**.

The layout of the Site, including Site features and the surrounding area, is depicted on **Figure 2**. The Site is bound by Milwaukee Avenue to the north; North 68th Street to the west; a commercial property (1536 N. 68th Street) to the south; and a residential property (6721 Milwaukee Avenue) to the east. The surrounding area consists of a mix of residential and commercial properties.

The Site operated as a gasoline service station from at least 1927 up to the late 1970's or early 1980's. The property was purchased as a vacant gasoline service station by OHM in 1982. The underground gasoline storage tanks were removed by the previous owners. OHM operated the Site as an active dry cleaning facility beginning in 1982. The former dry cleaning machine was located on the east side of the building. Tetrachloroethene (PCE) was the main dry cleaning solvent used in the cleaning process until its use was discontinued at this facility in 2009.

The Site lithology is comprised of poorly sorted glacially deposited till generally consisting of silty, clayey sand and gravel with interspersed and discontinuous lenses of silty clay and sandy clay, which are typically between 1-2 feet thick. Coarser material consisting of sand and gravel with varying amounts of silt and clay appear to be predominant; however, clay is present in the upper 5 to 6 feet below ground surface (bgs) at several investigation locations. This clay interval is referred to as the shallow zone in this report. Groundwater is encountered at depths ranging from approximately 48 to 52 feet bgs, and the direction of groundwater flow is toward the northeast. Groundwater at the Site does not appear to be impacted by any of the contaminants.

The primary contaminants of concern at the Site are PCE and intermediate products of the natural degradation of PCE, including: trichloroethene (TCE); dichloroethene (DCE); and vinyl chloride (VC). Petroleum volatile organic compounds (PVOCs) have also been detected at the Site due to the former use of the property as a gasoline service station. The source area for the PVOCs appears to be on the northwestern part of the Site relating to the location of past fuel tanks. The concentrations of PVOCs are relatively low, have not caused impacts to groundwater, and are not a risk for vapor intrusion to nearby buildings.

2.0 SVE PILOT STUDY ACTIVITIES

Pilot study activities performed include SVE well and monitoring point installation, SVE pilot testing, and analysis of the SVE pilot test data. This section provides a summary of the SVE field activities performed.

2.1 SVE Extraction Well and Monitoring Point Installation

On June 22-23, 2016, EnviroForensics directed the installation of two (2) SVE extraction wells (SVE-1s and SVE-1d) in separate boreholes; three (3) single vacuum monitoring points (VP-1, VP-2, and VP-3); and one (1) double-nested vacuum monitoring point (VP-4s/d). The "s" and "d" notations refer to "shallow" and "deep", respectively. The extraction wells were installed using hollow-stem auger drilling methods with 6.25-inch ID augers. The monitoring points were installed using 4.25-inch ID augers. The extraction wells and vacuum monitoring points were finished at grade with flush-mount steel vaults set in a concrete pad. The locations of the SVE extraction wells and vacuum monitoring points are depicted on **Figure 2**.

Shallow Zone

The shallow extraction well SVE-1s and the associated shallow vacuum monitoring points were designed to test the response to applied vacuum within the finer-grained material near the ground surface (i.e., the shallow zone). SVE-1s was constructed of 4-inch diameter schedule 40 PVC, with a 0.020-inch slot Vee-Wire® screen from 3 to 5 feet bgs. A filter pack consisting of coarse sand was installed from the bottom of the borehole to 1 foot above the screened interval. Bentonite-cement grout was installed above the filter pack to within 1 foot of the ground surface.

The shallow vacuum monitoring points were constructed with 1-inch diameter, schedule 40 PVC, 0.010-inch slotted well screen, and coarse sand filter pack. The screen for each single shallow point (VP-1, VP-2, and VP-3) was installed from 3 to 5 feet bgs. The screen for monitoring point VP-4s was installed from 5 to 10 feet bgs. The filter pack was installed from the bottom of each borehole to 1 foot above the screened interval. Hydrated bentonite chips were then added to within 1 foot of the ground surface.

In addition to the SVE extraction well and VP points, existing soil gas sampling points SG-4s, SG-5s, SG-6s, and SG-7s were also measured to gauge vacuum influence. These points are constructed of 1-inch diameter, schedule 40 PVC riser and 0.010-inch slotted well screens extending from 5 to 10 feet bgs.

A summary of construction information for SVE-1s and the shallow vacuum monitoring points, as well as other existing soil gas sampling points used during the pilot study, is provided in **Table 1**. Boring logs for the existing monitoring wells and soil borings within the SVE radius of influence (ROI) are provided in **Appendix A**.

Deep Zone

The deep extraction well SVE-1d and the associated deep vacuum monitoring point were designed to test the response to applied vacuum within the coarser-grained material encountered below the near-surface clay. SVE-1d was constructed of 4-inch diameter schedule 40 polyvinyl chloride (PVC) riser, with a 0.020-inch slot Vee-Wire® screen from 10 to 20 feet bgs. Hydrated bentonite chips were installed above the filter pack to within 1 foot of the ground surface.

Monitoring point VP-4d was constructed with 1-inch diameter, schedule 40 PVC, 0.010-inch slotted well screen, and coarse sand filter pack. The screened interval extends from 15 to 25 feet bgs. The filter pack was installed from the bottom of the borehole to 1 foot above the screened interval. Hydrated bentonite chips were then added to separate the deeper screen from the shallow (VP-4s) screen. In addition to VP-4d, existing soil gas sampling points SG-4d, SG-5d, SG-6d and SG-7d were also measured to gauge vacuum influence. These points are constructed of 1-inch diameter, schedule 40 PVC riser and 0.010-inch slotted well screens extending from 20 to 25 feet bgs.

A summary of construction information for SVE-1d and the deep vacuum monitoring point, as well as other existing soil gas sampling points used during the pilot study, is provided in **Table 2**. Boring logs for the existing monitoring wells and soil borings within the SVE radius of influence (ROI) are provided in **Appendix A**.

2.2 SVE Pilot Test Implementation

SVE pilot testing was performed on June 28-29, 2016 using a mobile, positive displacement blower capable of producing a flow rate of 857 actual cubic feet per minute (ACFM) at 15 inches of mercury (inHg). The vacuum system was piped to each SVE extraction well using 4-inch diameter PVC pipe. A generalized process and instrumentation diagram for the extraction system is depicted on **Figures 3 and 4**.

The shallow and deep extraction wells were tested separately and independently. The shallow well test was conducted for approximately 7 hours and consisted of three steps (steps 1 through 3), with applied vacuum and flow rate varied for each step by adjusting the variable frequency drive (VFD) that controlled the blower. System vacuum, as measured at the air-water separator, was adjusted during each step at 6.5, 10, and 13 inHg, which corresponded to applied vacuums at the SVE wellhead of 6.5, 9.5, and 11 inHg. A summary of each step and the recorded vacuum is included in **Table 3**.

The deep well test had a duration of approximately 5 hours, and consisted of three steps (steps 1 through 3), with applied vacuum and flow rate varied for each step by adjusting the VFD. System vacuum, as measured at the air-water separator, was adjusted during each step at 3, 5, and 6.2 inHg, which corresponded to applied vacuums at the SVE wellhead of 3.6, 5.5, and 6.0 inHg. A summary of each step and the recorded vacuum is included in **Table 4**.

During each step, volumetric flow rates, applied vacuums, recorded vacuums, and influent air total volatile organic compound (VOC) concentrations were monitored at fixed intervals. Influent flow rates were monitored using an anemometer. Applied vacuum to the extraction wells, as well as subsurface vacuums at the monitoring points, were measured using a hand-held digital manometer.

Effluent air samples were field-screened using a photoionization detector (PID) for the presence of VOCs. Effluent air samples were also collected from a sampling port using laboratory-supplied vacuum canisters, which were submitted to Envision Air Laboratories in Indianapolis, Indiana for analysis of select VOCs according to United States (U.S.) Environmental Protection Agency (EPA) Method TO-15. The TO-15 samples were collected at the beginning of steps 2 and 3 during both the shallow and deep well tests.

3.0 PILOT STUDY RESULTS

Pilot study data was analyzed to determine the following parameters:

1. System flow rates
2. VOC mass removal rates
3. Subsurface vacuum response

Vacuum, flow rate, and PID data collected at the remediation system during testing are presented in **Tables 5 and 6** and graphically depicted on **Charts 1 and 2**. Subsurface vacuum data is presented in **Tables 7 and 8** and graphically depicted on **Charts 3 and 4**. No measurable subsurface moisture was collected during testing.

3.1 System Flow Rates

Shallow Zone

During the shallow well test, system flow rates varied from a minimum of 60 standard cubic feet per minute (SCFM) during Step 1 at an applied vacuum of 6.5 in Hg to a maximum of 140 SCFM during Step 3 at an applied vacuum of 13 inHg.

Deep Zone

During the deep well test, system flow rates varied from a minimum of 100 standard cubic feet per minute (SCFM) during Step 1 at an applied vacuum of 3 in Hg to a maximum of 285 SCFM during Step 3 at an applied vacuum of 6.5 inHg.

3.2 VOC Mass Removal Rates

Shallow Zone

Effluent air samples were collected during steps 2 and 3 of the shallow well test. No sample was collected during step 1. PCE was the only compound detected in the samples. PCE concentrations ranged from 5,310 micrograms per cubic meter ($\mu g/m^3$) during Step 3 to 17,100 $\mu g/m^3$ during Step 2. A copy of the laboratory analytical report is provided in **Appendix B** and the results are summarized on **Table 9**.

Deep Zone

Effluent air samples were also collected during steps 2 and 3 of the deep well test. No sample was collected during step 1. PCE was the only compound detected in the samples. PCE concentrations ranged from 1,000 µg/m^3 during Step 2 to 1,120 µg/m^3 during Step 3. The results are summarized on **Table 10**.

The total VOC mass removed during steps 2 and 3 of both the shallow and deep well tests was 0.1 pounds. Coupling effluent vapor concentrations with the effluent flow rates over the test duration for each period indicates that the VOC mass removal rate would be approximately 51 pounds per year at startup during full-scale system operation; however, it is not known for how long this removal rate could be sustained. Additional mass recovery would be possible during full-scale system implementation due to the placement of additional extraction wells in the source area soils.

3.3 Subsurface Vacuum Response

While vacuum influence was observed in some deeper test points during the shallow zone pilot test activities and in some shallow test points during the deep zone pilot test activities, this secondary vacuum influence was substantially lower than the vacuums recorded at those points during the same zone testing. This indicates that while vertical propagation of vacuum is possible at the Site, it is inefficient when compared to the direct application of vacuum to a zone of soils with similar lithology. Therefore, only shallow monitoring points were included in the shallow zone ROI determination, and only deep monitoring points were included in the deep zone ROI determination.

Shallow Zone

A maximum observed monitoring point influence of 3.07 inches of water (inH_2O) vacuum was detected during Step 3 at monitoring point VP-2, approximately 6 feet away from SVE-1s. Subsurface vacuum response versus time for each monitoring point is graphically depicted in **Chart 3** and summarized in **Table 7**.

In order to evaluate the generalized SVE ROI for the shallow zone at the Site, a best-fit statistical distribution was identified for Step 1, Step 2, and Step 3 to describe the attenuation of subsurface vacuum with respect to distance from the extraction well. The recorded vacuums were averaged at each point during each step in order to mitigate variances in the data sets. The vacuum versus

distance data for Step 2 exhibited an exponential distribution and had the highest coefficient of determination (R^2) (0.77). These data indicated that step 2 provided the most linear, and therefore predictable, subsurface vacuum response. The minimum subsurface vacuum used for determining an effective ROI for vapor capture is 0.1 inH_2O. Using this minimum standard, the estimated vapor capture ROI for an applied vacuum of 10 inHg is approximately 52 feet. The data points and trend lines are presented in **Table 11** and **Charts 5a** through **5c**. The calculated ROI for the shallow zone test is depicted in **Figure 5**.

Deep Zone

A maximum observed monitoring point influence of 1.33 inH_2O vacuum was detected during Step 3 at monitoring point SG-4d, which is approximately 13 feet away from SVE-1d and screened just below the screened interval of SVE-1d. Subsurface vacuum response versus time for each monitoring point is graphically depicted in **Chart 4** and summarized in **Table 8**.

In order to evaluate the generalized SVE ROI for the deep zone at the Site, a best-fit statistical distribution was identified for Step 1, Step 2, and Step 3 to describe the attenuation of subsurface vacuum with respect to distance from the extraction well. The recorded vacuums were averaged at each point during each step in order to mitigate the variances in the data sets. The vacuum versus distance data for Step 3 exhibited an exponential distribution and had the highest R^2 (0.91). These data indicated that Step 3 provided the most linear, and therefore predictable, subsurface vacuum response. Using a minimum standard for vapor capture of 0.1 inH_2O, the estimated vapor capture ROI for an applied vacuum of 6.2 inHg is approximately 79 feet. The data points and trend lines are presented in **Table 12** and **Charts 6a** through **6c**. The calculated ROI for the deep zone test is depicted in **Figure 5**.

Grain size analysis conducted on soil samples collected from the extraction wells indicated a lower percentage of fine particles in the deep zone compared to the shallow zone. The difference in estimated ROI for the two zones may be explained, in part, by the difference in soil particle size distribution.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the pilot study indicate that SVE is a viable remedial alternative for unsaturated soils at the Site. It may also provide additional benefit for mitigation of vapor intrusion at the Site building and neighboring commercial property during implementation, but may require multiple SVE extraction points to achieve this goal. Evaluation of SVE design for remedial implementation at the property will consider the ROIs, flow rates, and other information identified in this report as well as Site-specific considerations such as local VOC concentrations, access limitations, lithologic heterogeneities, and subsurface utility corridors that may affect the vacuum propagation or influence the design criteria.

TABLES

TABLE 1

Monitoring Point Construction Information - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Monitoring Point I.D.	Date Installed	Drilling Method	Well Diameter (inches)	Screened Interval (feet bgs)
SVE-1s	6/23/2016	Hollow Stem Auger	4	3-5
VP-1	6/23/2016	Hollow Stem Auger	1	3-5
VP-2	3/17/2016	Hollow Stem Auger	1	3-5
VP-3	6/23/2016	Hollow Stem Auger	1	3-5
SG-4s	1/30/2015	Hollow Stem Auger	1	5-10
SG-5s	1/30/2015	Hollow Stem Auger	1	5-10
SG-6s	1/30/2015	Hollow Stem Auger	1	5-10
SG-7s	1/30/2015	Hollow Stem Auger	1	5-10
VP-4s	6/23/2016	Hollow Stem Auger	1	5-10

bgs = below ground surface

TABLE 2

Monitoring Point Construction Information - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Monitoring Point I.D.	Date Installed	Drilling Method	Well Diameter (inches)	Screened Interval (feet bgs)
SVE-1d	6/22/2016	Hollow Stem Auger	4	10-20
SG-4d	1/30/2015	Hollow Stem Auger	1	20-25
SG-5d	1/30/2015	Hollow Stem Auger	1	20-25
SG-6d	1/30/2015	Hollow Stem Auger	1	20-25
SG-7d	1/30/2015	Hollow Stem Auger	1	20-25
VP-4d	6/23/2016	Hollow Stem Auger	1	15-25

bgs = below ground surface

TABLE 3

SVE Pilot Study Testing Regime - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa SVE-1s

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Time Start	Time Stop	Hour Start	Hour Stop	Step Duration (hours)	System Vacuum (inHg)	Wellhead Vacuum (inHg)
1	6/28/2016 16:00	6/28/2016 18:15	0.0	2.3	2.3	6.5	6.4
2	6/28/2016 18:15	6/29/2016 08:15	2.3	16.3	14.0	10.0	9.5
3	6/29/2016 08:15	6/29/2016 11:15	16.3	19.3	3.0	13.0	11.0

TABLE 4

SVE Pilot Study Testing Regime - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing- Wauwatosa SVE-1d

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Time Start	Time Stop	Hour Start	Hour Stop	Step Duration (hours)	System Vacuum (inH_g)	Wellhead Vacuum (inH_g)
1	6/28/2016 10:00	6/28/2016 11:15	0.0	1.3	1.3	3.0	3.6
2	6/28/2016 11:15	6/28/2016 12:35	1.3	2.6	1.3	5.0	5.5
3	6/28/2016 12:35	6/28/2016 15:10	2.6	5.2	2.6	6.2	6.0

TABLE 5

SVE Pilot Study System Data - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa SVE-1s

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Date and Time	Test Hour	System Influent Vacuum (inHg)	System Effluent Flow Rate (SCFM)	System Effluent Temperature (°C)	System Effluent VOC Concentration (ppm)
1	6/28/16 16:30	0.5	6.5	60	54	1.3
	6/28/16 16:45	0.8	6.5	60	60	1.4
	6/28/16 17:00	1.0	6.5	60	54	1.5
	6/28/16 17:15	1.3	6.5	60	54	1.5
	6/28/16 18:00	2.0	6.5	60	60	1.5
2	6/28/16 18:30	2.5	10.0	100	77	0.3
	6/28/16 18:45	2.8	10.0	100	77	0.5
	6/28/16 19:00	3.0	10.0	100	77	0.5
	6/29/16 7:45	15.8	10.0	100	68	0.0
	6/29/16 8:00	16.0	10.0	100	71	0.0
3	6/29/16 8:30	16.5	13.0	140	79	0.0
	6/29/16 8:45	16.8	13.0	140	82	0.0
	6/29/16 9:00	17.0	13.0	140	82	0.0
	6/29/16 9:15	17.3	13.0	140	82	0.0
	6/29/16 9:45	17.8	13.0	140	82	0.2
	6/29/16 10:15	18.3	13.0	140	82	0.2
	6/29/16 10:45	18.8	13.0	140	85	0.2
	6/29/16 11:15	19.3	13.0	140	85	0.2

inHg = vacuum in inches of mercury (measured at air-water separator)

CFM = cubic feet per minute

ppm = parts per million by volume

VOC = Volatile organic compound

TABLE 6

SVE Pilot Study System Data - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Mmartinizing - Wauwatosa SVE-1d

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Date and Time	Test Hour	System Influent Vacuum (inHg)	System Effluent Flow Rate (SCFM)	System Effluent Temperature (°C)	System Effluent VOC Concentration (ppm)
1	6/28/16 10:00	0.0	3.0	100	54	1.3
	6/28/16 10:30	0.5	3.0	100	60	1.4
	6/28/16 10:45	0.8	3.0	100	54	1.5
2	6/28/16 11:15	1.3	5.0	240	54	1.5
	6/28/16 11:45	1.8	5.0	240	60	1.5
	6/28/16 12:15	2.3	5.0	240	77	0.3
	6/28/16 12:30	2.5	5.0	240	77	0.5
3	6/28/16 12:50	2.8	5.0	240	77	0.5
	6/28/16 13:20	3.3	5.0	240	68	0.0
	6/28/16 14:00	4.0	6.5	285	71	0.0
	6/28/16 14:15	4.3	6.5	285	79	0.0
	6/28/16 14:30	4.5	6.5	285	82	0.0
	6/28/16 15:10	5.2	6.5	285	82	0.0

inHg = vacuum in inches of mercury (measured at air-water separator)

SCFM = standard cubic feet per minute

ppm = parts per million by volume

VOC = Volatile organic compound

TABLE 7

SVE Pilot Study Subsurface Data - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa SVE-1s

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Date and Time	Influent Flow Rate (ACFM)	Test Hour	SVE-1s	VP-1	VP-2	VP-3	SG-4s	SG-4d	VP-4d	VP-4s
	Distance from SVE-1s (feet)			0	17	6	18	13	12	39	39
1	6/28/16 16:15	--	0.3	6.617	0.81	1.80	0.60	0.41	0.14	x	x
	6/28/16 16:30	138	0.5	6.553	0.80	1.81	0.60	0.40	0.14	x	x
	6/28/16 16:45	139	0.8	6.395	0.77	1.79	0.59	0.37	0.11	x	x
	6/28/16 17:00	134	1.1	6.371	0.79	1.80	0.60	0.39	0.13	x	x
	6/28/16 17:15	136	1.3	6.356	0.78	1.82	0.61	0.40	0.14	x	x
	6/28/16 18:00	137	2.0	6.356	0.82	1.84	0.63	0.42	0.15	0.11	0.20
2	6/28/16 18:30	244	2.6	9.672	1.17	2.75	0.89	0.56	0.17	0.10	0.24
	6/28/16 18:45	258	2.8	9.632	1.16	2.76	0.89	0.57	0.18	0.10	0.24
	6/28/16 19:00	281	3.0	9.593	1.14	2.75	0.90	0.58	0.18	0.11	0.24
	6/29/16 7:45	257	15.8	9.435	1.16	2.79	0.89	0.59	0.17	0.11	0.25
	6/29/16 8:00	249	16.1	9.514	1.16	2.79	0.89	0.59	0.18	0.12	0.25
3	6/29/16 8:30	270	16.5	10.658	1.27	3.06	0.97	0.61	0.19	0.12	0.26
	6/29/16 8:45	274	16.8	10.856	1.29	3.06	0.97	0.62	0.19	0.12	0.28
	6/29/16 9:00	267	17.0	10.911	1.27	3.07	0.97	0.61	0.18	0.11	0.26
	6/29/16 9:15	247	17.3	11.093	1.27	3.07	0.97	0.61	0.19	0.11	0.26
	6/29/16 9:45	257	17.8	11.103	1.28	3.07	0.98	0.63	0.18	0.11	0.27
	6/29/16 10:15	253	18.3	11.132	1.28	3.06	0.97	0.63	0.19	0.12	0.27
	6/29/16 10:45	250	18.8	11.115	1.28	3.06	0.97	0.63	0.18	0.11	0.26
	6/29/16 11:15	254	19.3	11.140	1.28	3.07	0.98	0.64	0.19	0.12	0.27
Maximum vacuum:				**11**	**1.290**	**3.070**	**0.980**	**0.640**	**0.190**	**0.120**	**0.280**

All values are vacuum readings, in units of inches water column; except for SVE-1s is in units of inches of mercury
ACFM = actual cubic feet per minute

TABLE 8

SVE Pilot Study Subsurface Data - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Mmartinizing - Wauwatosa SVE-1d

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step	Date and Time	Influent Flow Rate (ACFM)	Test Hour	SVE-1d	SG-4s	SG-4d	SG-5s	SG-5d	SG-6s	SG-6d	SG-7s	SG-7d	VP-4d	VP-4s
Distance from SVE-1d (feet)				**0**	**12**	**13**	**24**	**24**	**26**	**27**	**25**	**25**	**69**	**69**
1	6/28/16 10:15	--	0.3	3.790	0.43	0.62	0.27	0.33	0.27	0.25	0.30	0.17	0.00	0.18
	6/28/16 10:30	1578.2	0.5	3.553	0.40	0.62	0.25	0.33	0.24	0.24	0.27	0.17	0.00	0.17
	6/28/16 10:45	1588.6	0.7	3.514	0.43	0.64	0.26	0.33	0.25	0.24	0.29	0.18	0.00	0.17
	6/28/16 11:00	1534.2	1.0	3.435	0.42	0.64	0.27	0.33	0.26	0.25	0.28	0.18	0.00	0.18
2	6/28/16 11:30	2803	1.5	5.408	0.65	0.89	0.40	0.49	0.38	0.40	0.43	0.29	0.00	0.27
	6/28/16 11:45	2956.3	1.8	5.527	0.67	0.92	0.40	0.50	0.39	0.33	0.43	0.28	0.00	0.25
	6/28/16 12:00	3221.4	2.0	5.645	0.67	0.93	0.41	0.50	0.39	0.36	0.44	0.28	0.00	0.25
	6/28/16 12:15	2942.1	2.2	5.527	0.66	0.91	0.43	0.50	0.39	0.36	0.44	0.29	0.00	0.25
3	6/28/16 12:50	3093.1	2.8	5.487	0.66	0.92	0.41	0.50	0.39	0.37	0.51	0.37	0.15	0.34
	6/28/16 13:20	3061.4	3.3	4.895	0.75	1.02	0.51	0.60	0.50	0.47	0.54	0.38	0.15	0.35
	6/28/16 14:00	2836.5	4.0	6.553	1.04	1.33	0.72	0.81	0.69	0.65	0.73	0.53	0.22	0.50
	6/28/16 14:15	2944.3	4.2	6.474	0.97	1.29	0.74	0.64	0.61	0.58	0.66	0.48	0.16	0.42
	6/28/16 14:30	2896.1	4.5	6.395	0.95	1.25	0.63	0.73	0.60	0.57	0.64	0.47	0.15	0.42
	6/28/16 14:45	2864.3	4.8	6.227	0.92	1.24	0.63	0.71	0.59	0.53	0.64	0.44	0.13	0.41
	6/28/16 15:10	2911.7	5.2	6.189	0.94	1.25	0.60	0.71	0.57	0.51	0.60	0.43	0.13	0.40
Maximum vacuum:				6.55	1.04	1.33	0.74	0.81	0.69	0.65	0.73	0.53	0.22	0.50

All values are vacuum readings, in units of inches water column; except for SVE-1d is in units of inches of mercury
ACFM = actual cubic feet per minute

TABLE 9

SVE Pilot Study Mass Removal Estimates - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step 2; Sample SVE-1S-2; Flow rate = 100 SCFM; Duration = 14 Hours					
Analyte	**Concentration ($\mu g/m^3$)**	**Removal Rate (lb/hour)**	**Removal Rate (lb/year)**	**Removal Rate (tons/year)**	**Mass Removed (lb)**
Tetrachloroethene	**17,100**	**0.00641**	**56.1**	**0.028**	**0.08969**
Trichloroethene	<10.7	< 0	< 0	< 0	NA
cis-1,2-Dichloroethene	<39.6	< 0.00001	< 0.1	< 0.00005	NA
trans-1,2-Dichloroethene	<39.6	< 0	< 0	< 0	NA
Vinyl Chloride	<6.4	< 0	< 0	< 0	NA

Step 3; Sample SVE-1S-3; Flow rate = 140 SCFM; Duration = 3 Hours					
Analyte	**Concentration ($\mu g/m^3$)**	**Removal Rate (lb/hour)**	**Removal Rate (lb/year)**	**Removal Rate (tons/year)**	**Mass Removed (lb)**
Tetrachloroethene	**5,310**	**0.00279**	**24.4**	**0.012**	**0.00836**
Trichloroethene	<10.7	< 0.00001	< 0.1	< 0	NA
cis-1,2-Dichloroethene	<39.6	< 0.00002	< 0.2	< 0.0001	NA
trans-1,2-Dichloroethene	<39.6	< 0.00002	< 0.2	< 0.0001	NA
Vinyl Chloride	<6.4	< 0	< 0	< 0	NA

Total estimated mass removed during steps 2 and 3 (lb):	**0.098**

Notes:

Duration = Length of time applied to mass removal estimate

Removal Rate = concentration multiplied by duration

NA = Not Available

Mass Removed = Estimated mass removed through SVE system during representative pilot study periods

SCFM = Standard cubic feet per minute

µg = microgram

m = meter

lb = pound

TABLE 10

SVE Pilot Study Mass Removal Estimates - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa SVE-1d

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Step 1; Sample SVE-1D-2; Flow rate = 240 SCFM; Duration = 1.3 Hours					
Analyte	**Concentration ($\mu g/m^3$)**	**Removal Rate (lb/hour)**	**Removal Rate (lb/year)**	**Removal Rate (tons/year)**	**Mass Removed (lb)**
Tetrachloroethene	**1,000**	**0.00090**	**7.9**	**0.004**	**0.00112**
Trichloroethene	<10.7	< 0.00001	< 0.1	< 0	NA
cis-1,2-Dichloroethene	<39.6	< 0.00004	< 0.4	< 0.0002	NA
trans-1,2-Dichloroethene	<39.6	< 0.00001	< 0.1	< 0.00005	NA
Vinyl Chloride	<6.4	< 0	< 0	< 0	NA

Step 2; Sample SVE-1D-3; Flow rate = 285 SCFM; Duration = 1.3 Hours					
Analyte	**Concentration ($\mu g/m^3$)**	**Removal Rate (lb/hour)**	**Removal Rate (lb/year)**	**Removal Rate (tons/year)**	**Mass Removed (lb)**
Tetrachloroethene	**1,120**	**0.00120**	**10.5**	**0.005**	**0.00159**
Trichloroethene	<10.7	< 0.00001	< 0.1	< 0	NA
cis-1,2-Dichloroethene	<39.6	< 0.00004	< 0.4	< 0.0002	NA
trans-1,2-Dichloroethene	<39.6	< 0.00004	< 0.4	< 0.0002	NA
Vinyl Chloride	<6.4	< 0.00001	< 0.09	< 0.00005	NA

Total estimated mass removed during steps 2 and 3 (lb):	**0.003**

Duration = Length of time applied to mass removal estimate

Removal Rate = concentration multiplied by duration

NA = Not Available

Mass Removed = Estimated mass removed through SVE system during representative pilot study periods

SCFM = Standard cubic feet per minute

µg = microgram

m = meter

lb = pound

TABLE 11

Radius of Influence Calculation Data - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Monitoring Point I.D.	Distance from SVE-1s (feet)	Average Vacuum (inH_2O)		
		Step 1	Step 2	Step 3
VP-1	17	0.795	1.158	1.278
VP-2	6	1.810	2.768	3.065
VP-3	18	0.605	0.892	0.973
SG-4s	13	0.398	0.578	0.623
VP-4s	39	0.200	0.244	0.266

- inH_2O = inches of water column

TABLE 12

Radius of Influence Calculation Data - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

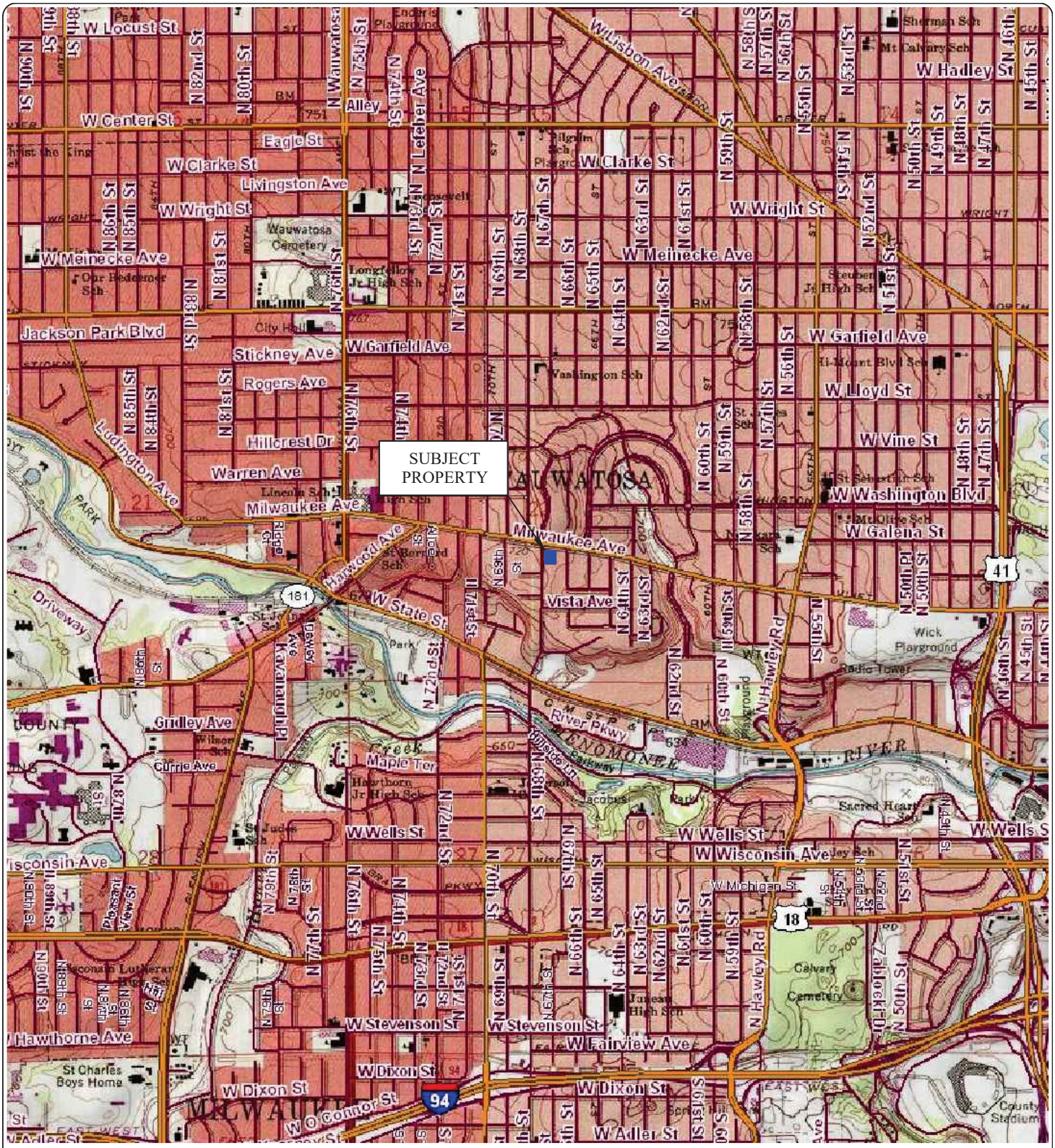
Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

Monitoring Point I.D.	Distance from SVE-1d (feet)	Average Vacuum (inH_2O)		
		Step 1	Step 2	Step 3
SG-4d	13	0.630	0.913	1.186
SG-5d	24	0.330	0.498	0.671
SG-6d	27	0.245	0.363	0.526
SG-7d	25	0.175	0.285	0.443
VP-4d	69	0.000	0.000	0.156

- inH_2O = inches of water column

FIGURES



Scale 1:24,000

1 1/2 0 1 Mile

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

1 .5 0 1 Kilometer

N

Source: US Geological Survey, Milwaukee, Wisconsin Quadrangle, 2007

No.	Date	Revision	Approved

ENVIRO forensics

ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.

602 N. Capitol Ave., Ste 210 • Indianapolis, IN 46204

EnviroForensics.com

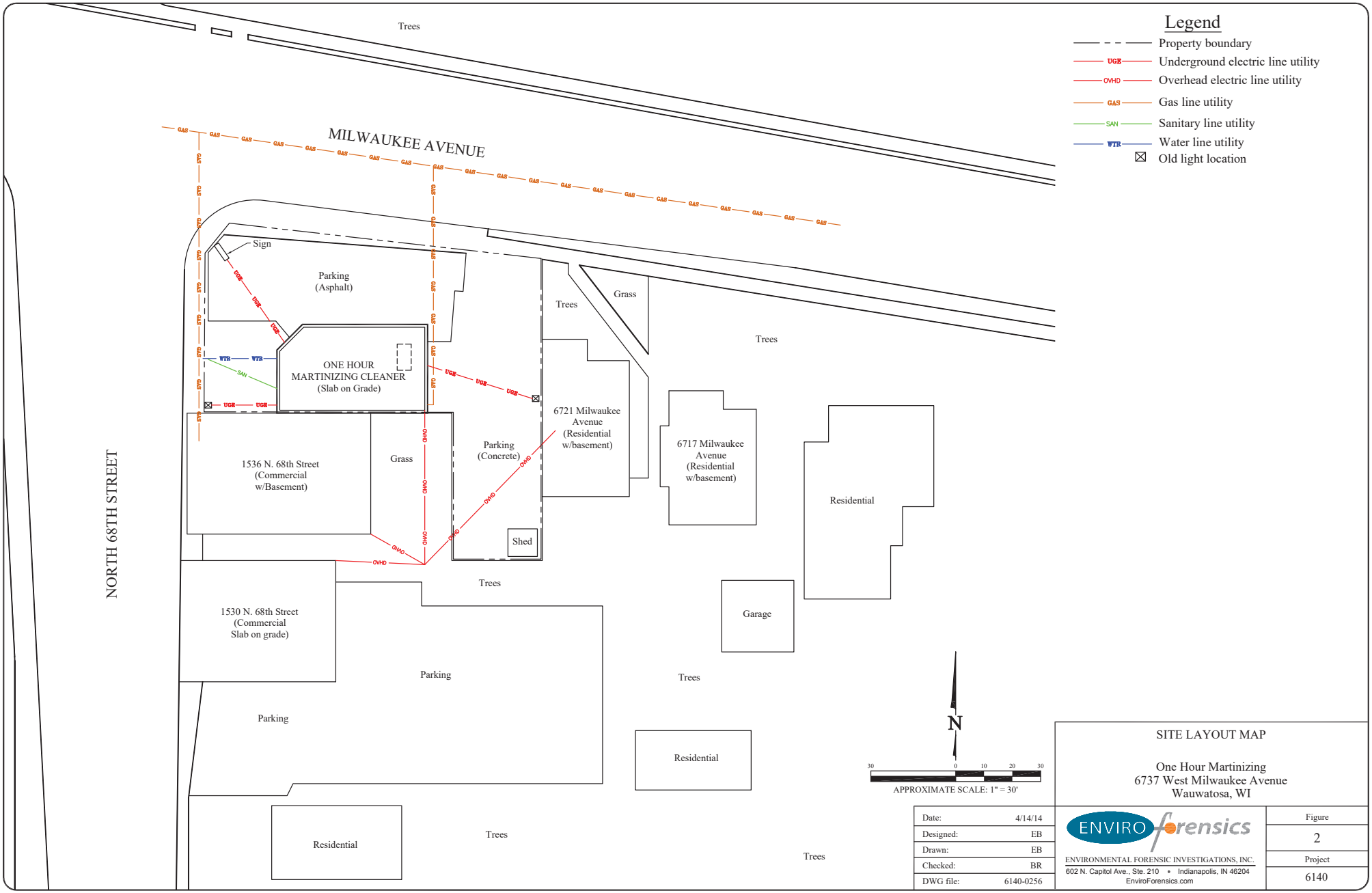
Date:	8/9/13
Designed:	MMM
Drawn:	MMM
Checked:	BK
DWG file:	66372-11

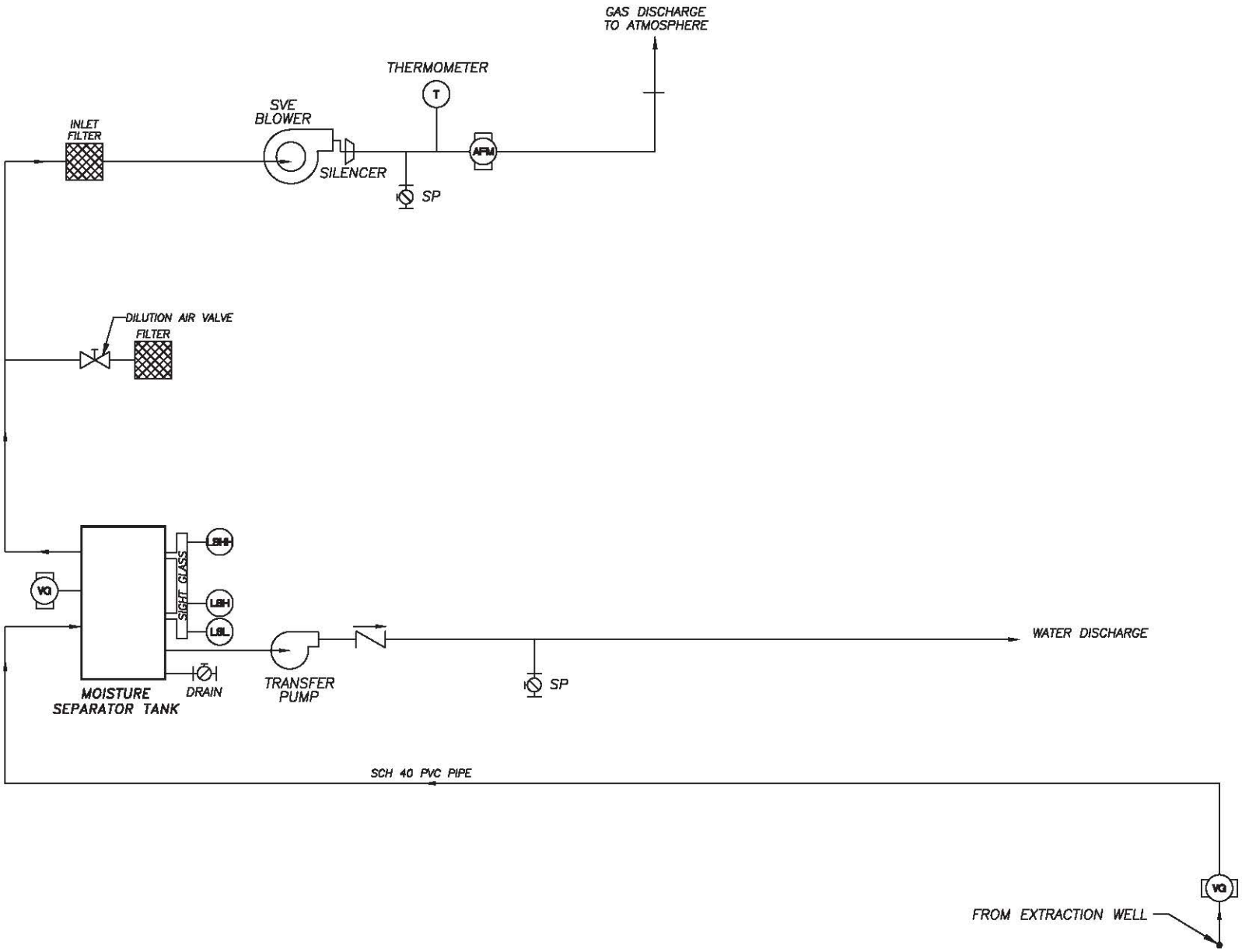
SITE LOCATION MAP

One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure
1
Project
6140

K:\Drawings\6140 Wauwatosa-OHM\Drawing\66372-11.dwg


Legend
Property boundary
Underground electric line utility
Overhead electric line utility
Gas line utility
Sanitary line utility
Water line utility
Old light location
MILWAUKEE AVENUE
NORTH 68TH STREET
Trees
Sign
Parking
(Asphalt)
ONE HOUR
MARTINIZING CLEANER
(Slab on Grade)
Grass
Trees
Trees
6721 Milwaukee
Avenue
(Residential
w/basement)
6717 Milwaukee
Avenue
(Residential
w/basement)
Residential
1536 N. 68th Street
(Commercial
w/Basement)
Grass
Parking
(Concrete)
Shed
Trees
1530 N. 68th Street
(Commercial
Slab on grade)
Garage
Parking
Trees
Parking
Residential
Residential
Trees
Trees
N
30 0 10 20 30
APPROXIMATE SCALE: 1" = 30'
SITE LAYOUT MAP
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI
Date: 4/14/14
Designed: EB
Drawn: EB
Checked: BR
DWG file: 6140-0256
ENVIRO forensics
ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
602 N. Capitol Ave., Ste. 210 • Indianapolis, IN 46204
EnviroForensics.com
Figure
2
Project
6140



No.	Date	Revision	Approved

ENVIRO forensics

ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.

602 N. Capitol Ave., Ste. 210 • Indianapolis, IN 46204

EnviroForensics.com

Date:	3/23/15
Designed:	EB
Drawn:	EB
Checked:	OD
DWG file:	6189-1026

SVE PILOT SYSTEM PROCESS AND INSTRUMENTATION DIAGRAM

One Hour Martinizing

6737 West Milwaukee Avenue

Wauwatosa, WI

Figure
3
Project
6189

VALVE AND PIPING SYMBOLS

- GATE VALVE
- SOLENOID VALVE
- CHECK VALVE
- BALL VALVE
- SAMPLING PORT
- EXHAUST TO ATMOSPHERE (INSIDE)
- EXHAUST TO ATMOSPHERE (OUTSIDE)
- PRESSURE RELIEF VALVE
- VACUUM GAUGE

ABBREVIATIONS

DP	DIFFERENTIAL PRESSURE
DO	DISSOLVED OXYGEN
FC	FAIL CLOSED
FI	FAIL INDETERMINATE
FL	FAIL LOCKED
FO	FAIL OPEN
FQ	FAIL QUANTIFIER
HOA	HAND–OFF–AUTOMATIC
HS	HAND SWITCH
IL	INDICATOR LIGHT
I/I	CURRENT–TO–CURRENT
I/P	CURRENT–TO–PNEUMATIC
KC	PROGRAM CONTROLLER
LC	LEVEL CONTROLLER
LEL	LOWER EXPLOSIVE LIMIT
LR	LOCAL–REMOTE
LS	LEVEL SWITCH
LSHH, LSL, LSH	LIQUID SWITCH HIGH / LOW
M	MOTOR
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
P	PRESSURE
PI	PRESSURE INDICATOR
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
PRV	PRESSURE RELIEF VALVE
PSH	PRESSURE SWITCH – HIGH
SG	SIGHT GLASS
SP	SAMPLING PORT
UA	UNIVERSAL ALARM
FMT	FLOW METER TOTALIZER
AFM	AIR FLOW METER

EQUIPMENT SYMBOLS

- PUMP
- BLOWER

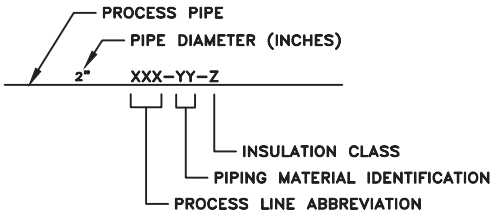
LINE SYMBOLS

- PROCESS PIPES OR CHANNELS
- ELECTRIC SIGNAL
- COMPRESSED AIR LINE

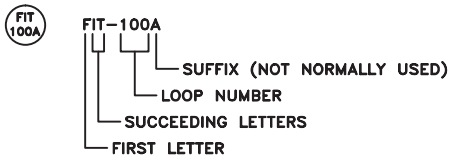
GENERAL INSTRUMENT SYMBOLS

- LOCALLY MOUNTED
- PANEL MOUNTED
- REAR–OF–PANEL MOUNTED
- INTERLOCK (I)
- PURGE (P)

PROCESS PIPING IDENTIFICATION



INSTRUMENT IDENTIFICATION



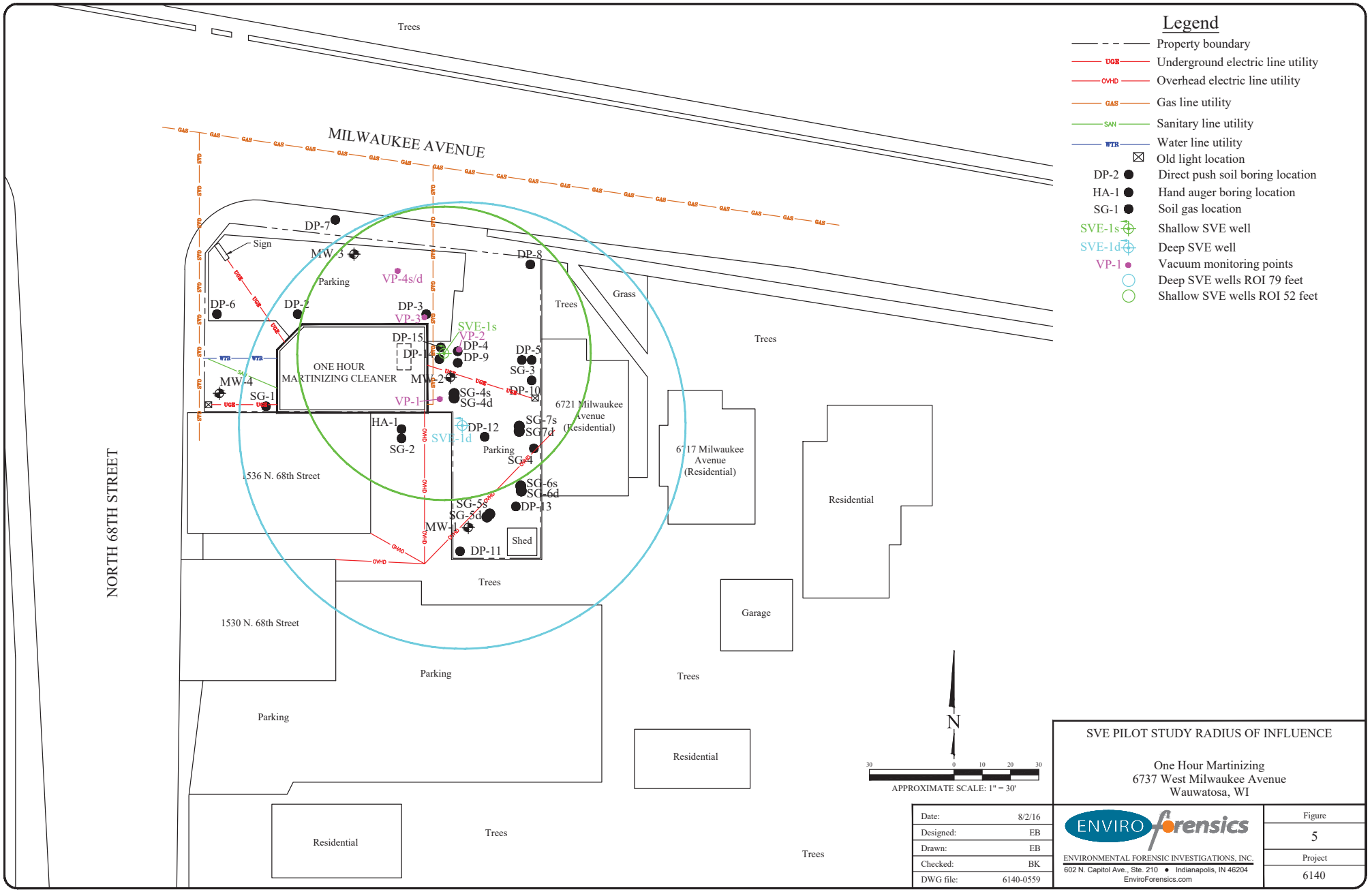
No.	Date	Revision	Approved

ENVIRO forensics
ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
602 N Capitol Ave., Ste 210 • Indianapolis, IN 46204
EnviroForensics.com

Date:	3/23/15
Designed:	EB
Drawn:	EB
Checked:	OD
DWG file:	6189-1026

PROCESS AND INSTRUMENTATION LEGEND
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI

Figure 4
Project 6189


Trees
MILWAUKEE AVENUE
NORTH 68TH STREET
DP-7
Sign
MW-3
VP-4s/d
Parking
DP-8
DP-6
DP-2
DP-3
VP-3
Trees
Grass
SVE-1s
VP-2
DP-15
DP-4
DP-9
DP-5
SG-3
ONE HOUR
MARTINIZING CLEANER
MW-2
MW-4
SG-1
SG-4s
SG-4d
DP-10
VP-1
6721 Milwaukee
Avenue
(Residential)
HA-1
DP-12
SG-7s
SG7d
SVE-1d
SG-2
Parking
SG-4
1536 N. 68th Street
6717 Milwaukee
Avenue
(Residential)
SG-6s
SG-6d
DP-13
SG-5s
SG-5d
MW-1
Shed
DP-11
Residential
Trees
1530 N. 68th Street
Garage
Parking
Trees
Parking
Residential
Residential
Trees
Trees
N
30 0 10 20 30
APPROXIMATE SCALE: 1" = 30'
Legend
Property boundary
Underground electric line utility
Overhead electric line utility
Gas line utility
Sanitary line utility
Water line utility
Old light location
DP-2 Direct push soil boring location
HA-1 Hand auger boring location
SG-1 Soil gas location
SVE-1s Shallow SVE well
SVE-1d Deep SVE well
VP-1 Vacuum monitoring points
Deep SVE wells ROI 79 feet
Shallow SVE wells ROI 52 feet
SVE PILOT STUDY RADIUS OF INFLUENCE
One Hour Martinizing
6737 West Milwaukee Avenue
Wauwatosa, WI
Date: 8/2/16
Designed: EB
Drawn: EB
Checked: BK
DWG file: 6140-0559
ENVIRO forensics
ENVIRONMENTAL FORENSIC INVESTIGATIONS, INC.
602 N. Capitol Ave., Ste. 210 • Indianapolis, IN 46204
EnviroForensics.com
Figure
5
Project
6140

CHARTS

CHART 1

Extraction Regime and Organic Vapor Concentrations - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

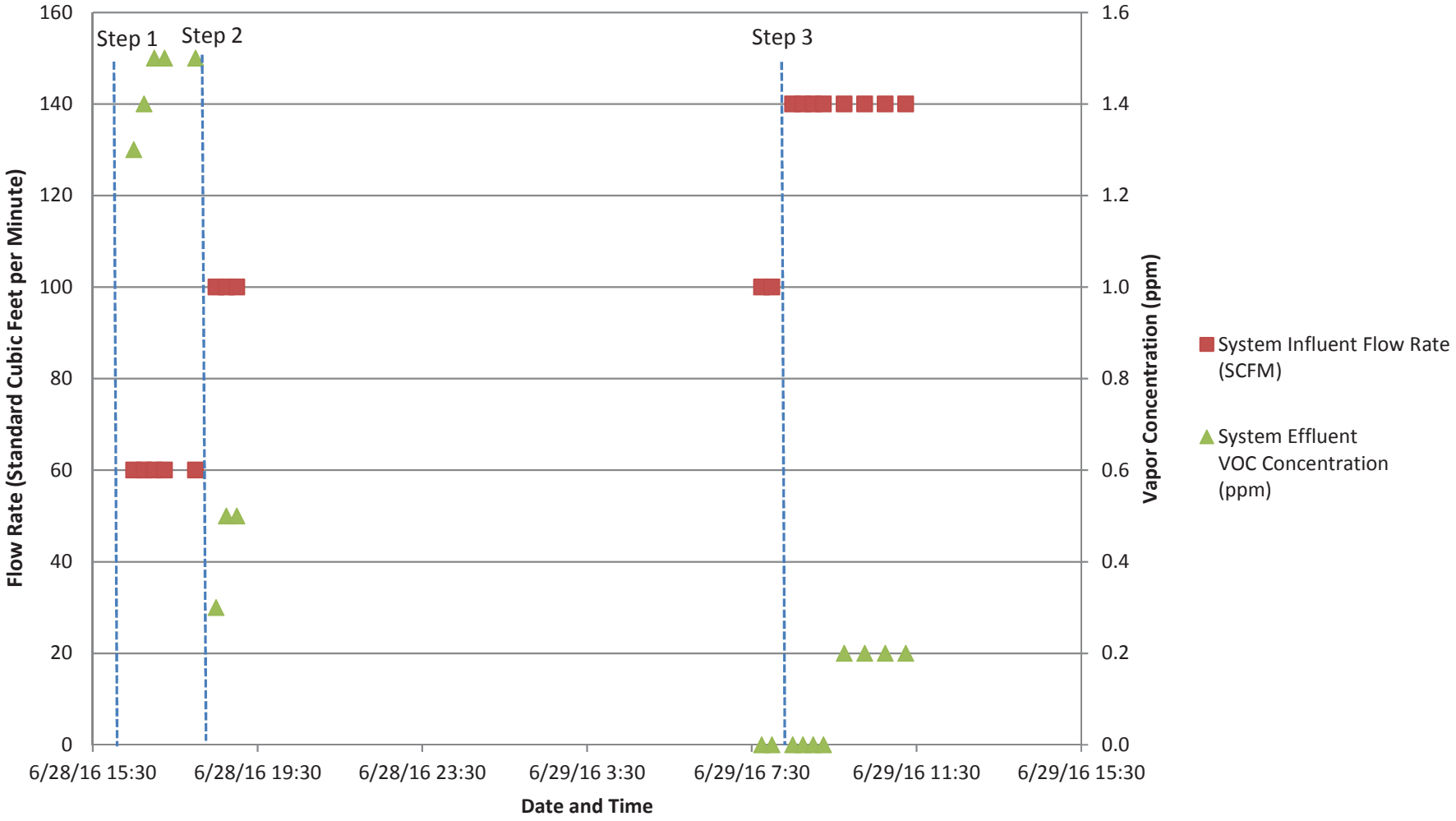


CHART 2

Extraction Regime and Organic Vapor Conentrations - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

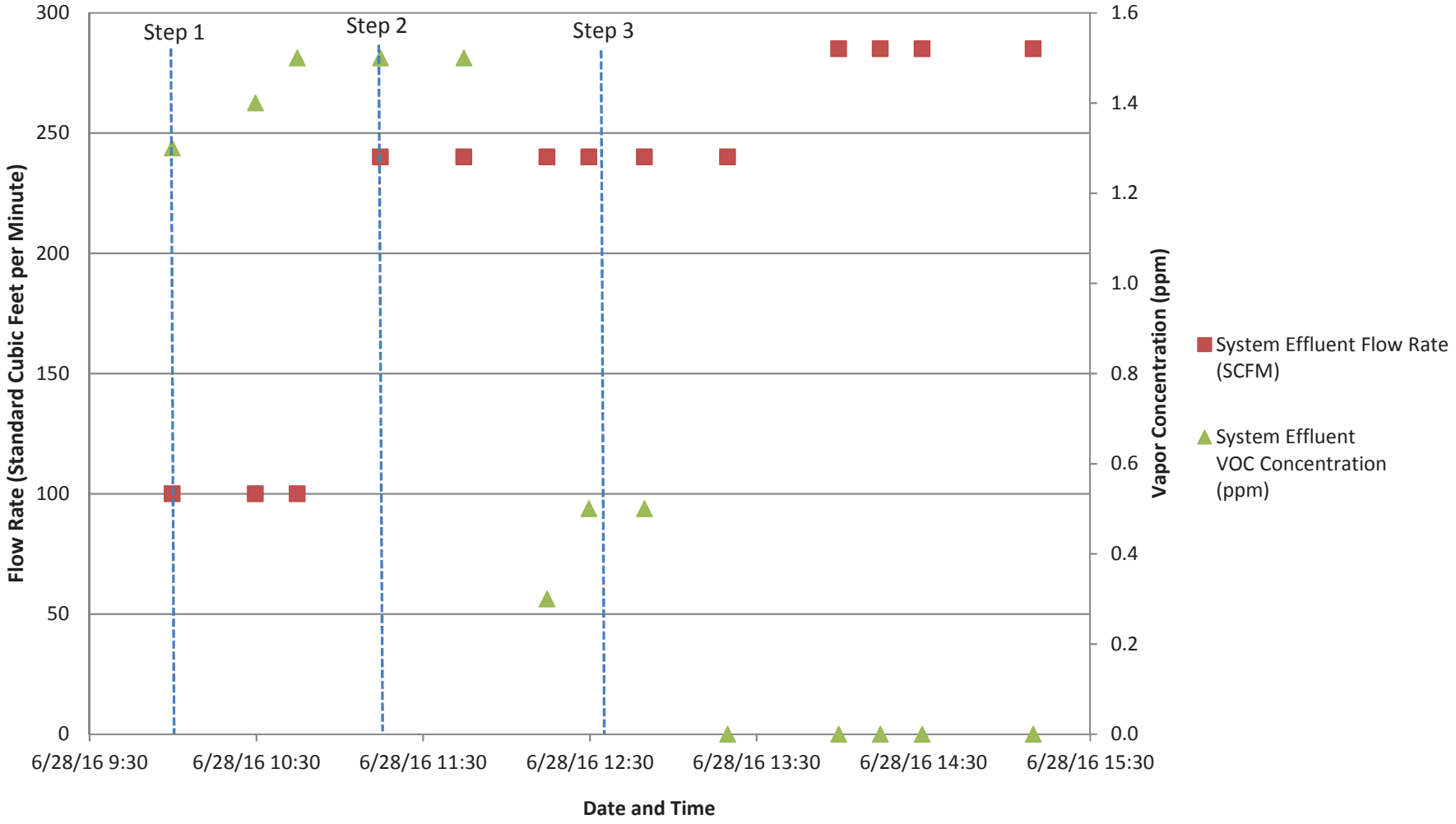


CHART 3

Subsurface Vacuum Data - Shallow Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing - Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

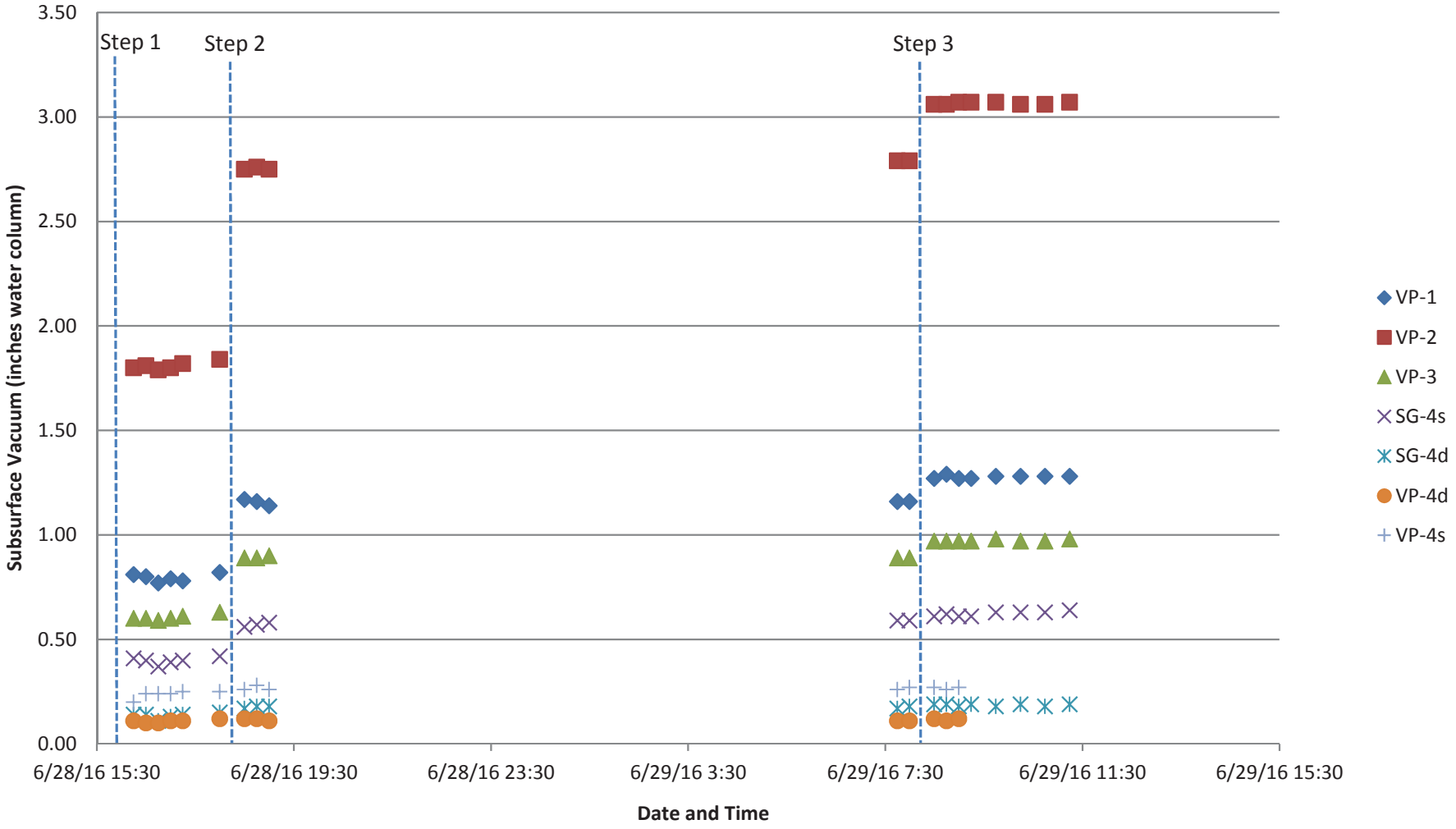


CHART 4

Subsurface Vacuum Data - Deep Zone

Soil Vapor Extraction Pilot Study Report

One Hour Martinizing -Wauwatosa

Wauwatosa, Wisconsin

WDNR BRRTS No. 02-41-551923

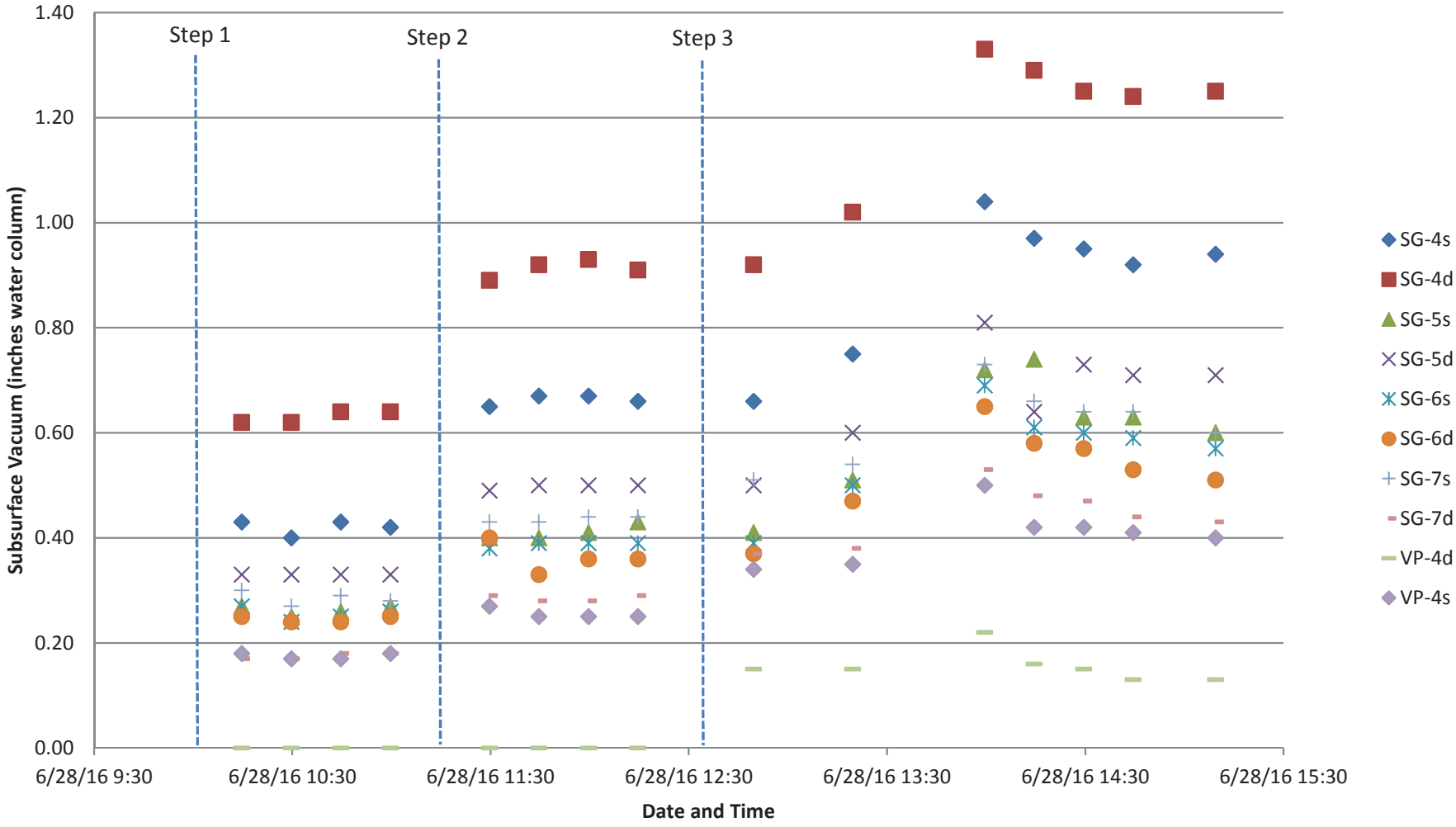


CHART 5a
Radius of Influence - Shallow Zone
Applied Vacuum 6.5 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing - Wauwatosa
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923

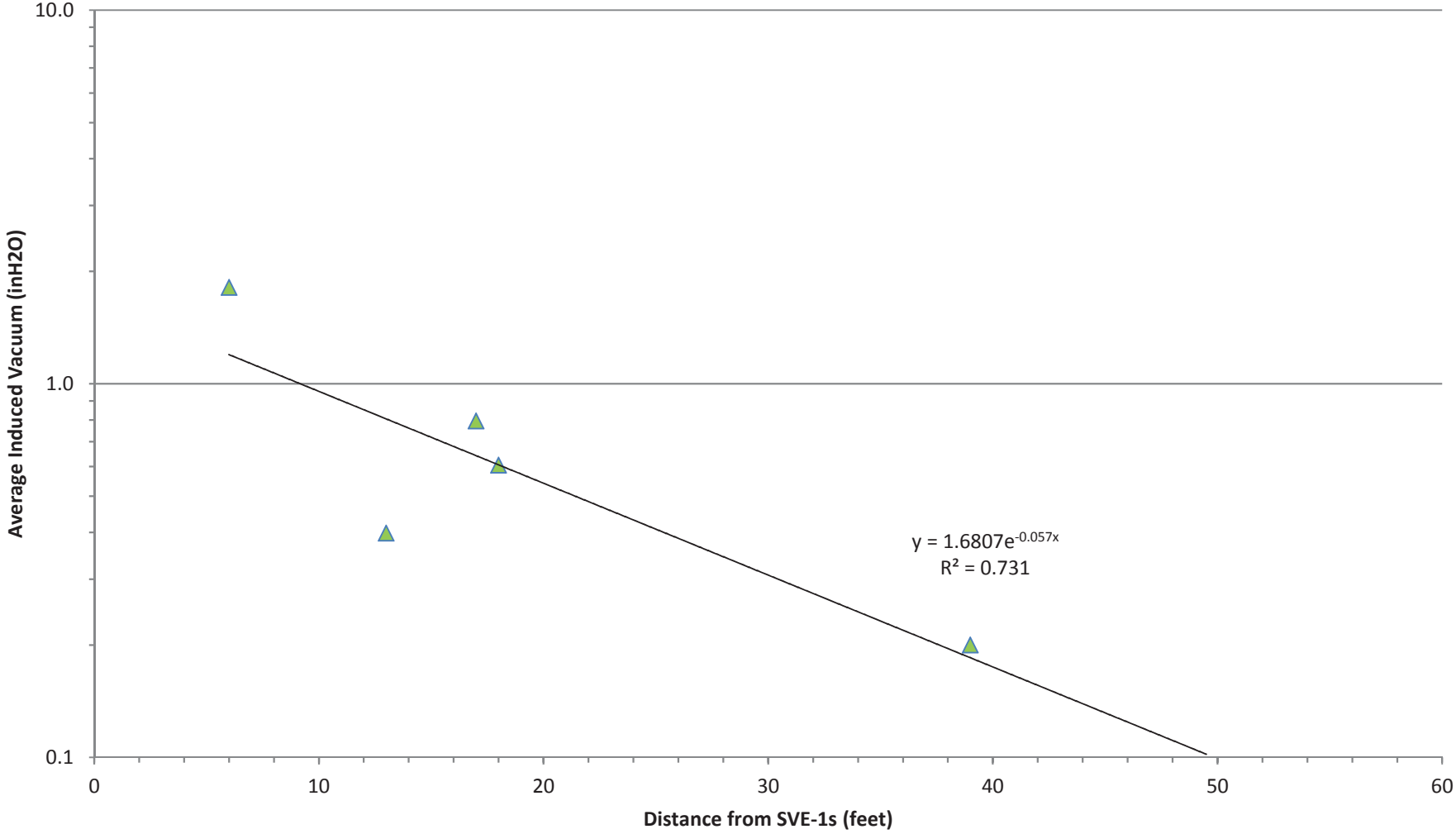


CHART 5b
Radius of Influence - Shallow Zone
Applied Vacuum 10 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing - Wauwatosa
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923

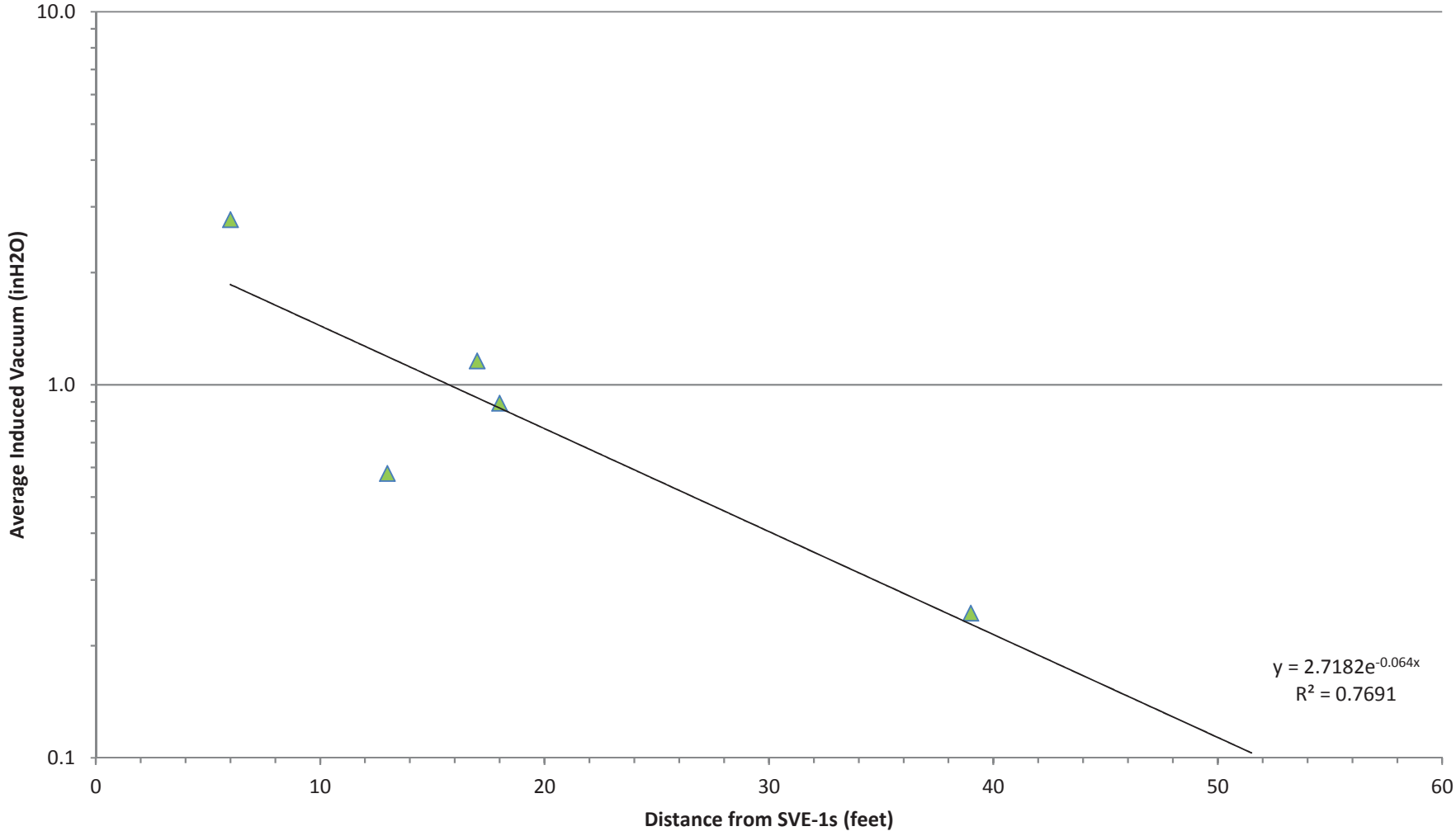


CHART 5c
Radius of Influence - Shallow Zone
Applied Vacuum 13 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing - Wauwatosa
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923

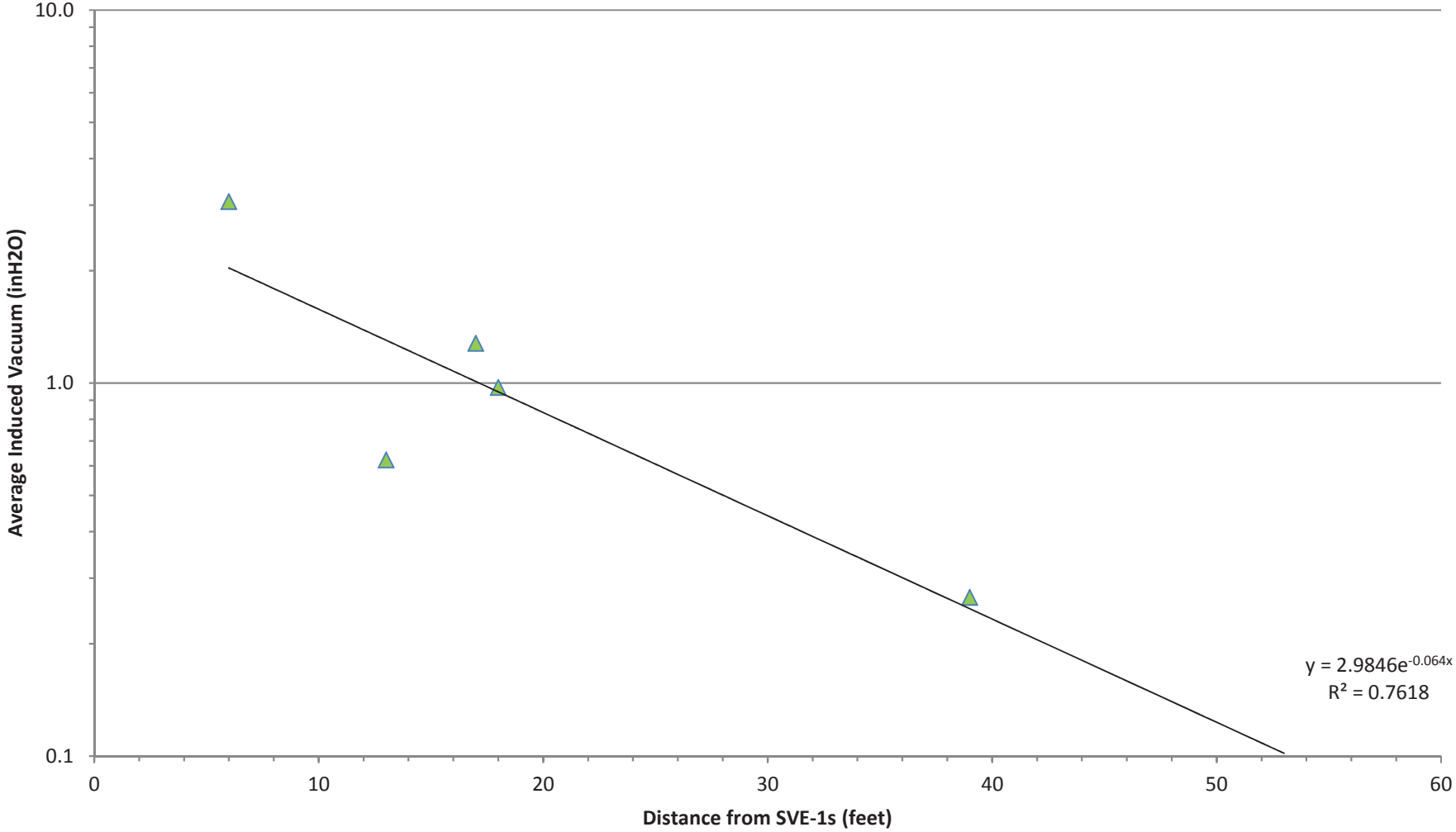


CHART 6a
Radius of Influence - Deep Zone
Applied Vacuum 3 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing - Wauwatosa
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923

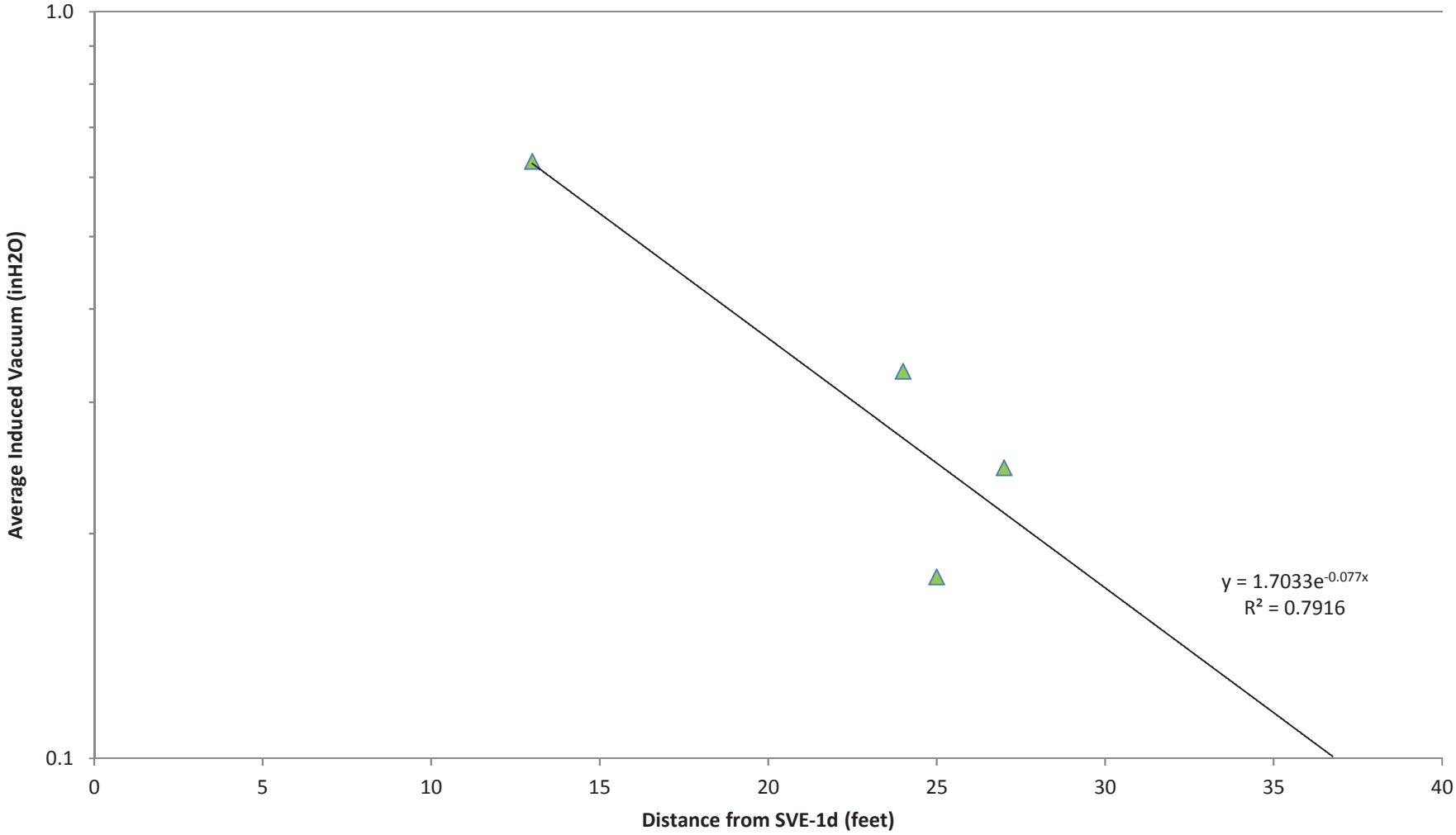


CHART 6b
Radius of Influence - Deep Zone
Applied Vacuum 5 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing - Wauwatosa
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923

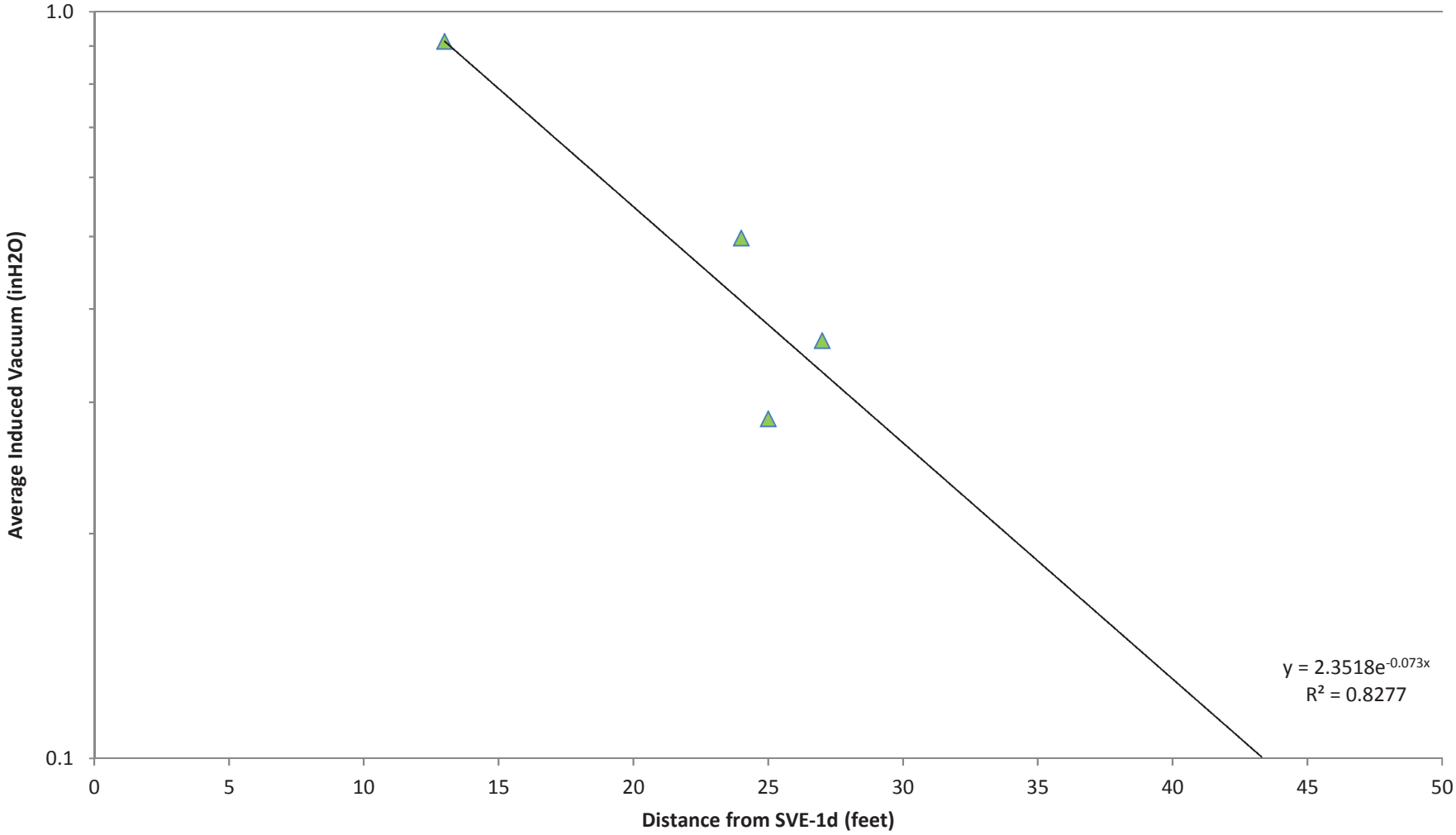
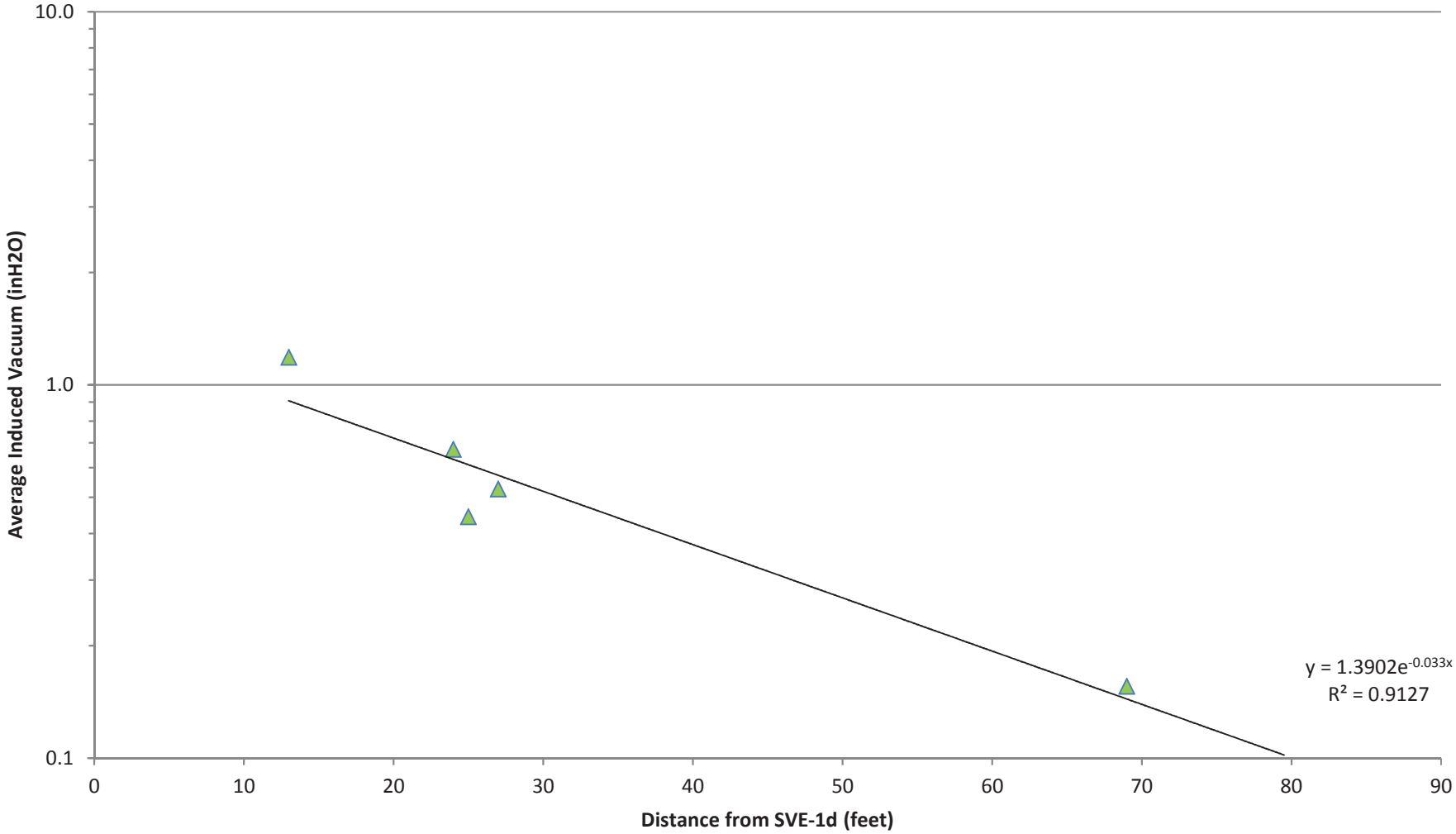


CHART 6c
Radius of Influence - Deep Zone
Applied Vacuum 6.2 inHg
Soil Vapor Extraction Pilot Study Report
One Hour Martinizing
Wauwatosa, Wisconsin
WDNR BRRTS No. 02-41-551923



APPENDIX A

Boring Logs

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		DP-9

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	12 / 13 / 2010 (m m / d d / y y y y)	12 / 13 / 2010 (m m / d d / y y y y)	Direct Push

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _	_ _ _ _		_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: ☒) or Boring Location ☒
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____

Lat 43° 3 ' 4.4 "
Long 87° 59 ' 46.7"

Local Grid Location
☒ N ☐ E
_____ Feet ☐ S _____ Feet ☒ W

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	0.0 - 0.5 (0-0.5)PAVEMENT(PA):Asphalt road base	PA									
			2	0.5 - 4.0 (0.5-4)Clayey SAND(SC):Brown medium grained SAND with CLAY and some Gravel. Slightly loose and slightly moist.	SC									
			4	4.0 - 8.0 (4-8)Poorly graded SAND(SP):Poorly graded coarse to medium grained Sand with trace Clay. Medium dense	SP									
			6											
			8	8.0 - 11.0 (8-11)Poorly graded SAND(SP):Poorly graded fine grained Sand with some Clay.	SP									
			10											
			11	11.0 - 28.0 (11-28)Poorly graded SAND(SP):Poorly graded medium to coarse grained Sand with some Gravel. Decreasing Gravel content downward. Loose	SP									
			12											
			14											
			16											
			18											
			20											
			22											
			24											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Facility/Project Name: OHM-6140-Wauwatosa
Boring No. : DP-9

License/Project/Monitoring No. :
WI Unique Well No. :

Sample										Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			26											
			28	28.0 - 31.0 (28-31)Clayey SAND(SC):Clayey fine grained Sand with Clay. Slightly dense and moist	SC									
			30											
			32	31.0 - 32.0 (31-32)Well graded SAND(SW):Medium to coarse grained Sand with some Clay and Gravel and trace Cobbles. Slightly loose and moist.	SW									

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		DP-10/SG--3

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	12 / 13 / 2010 (m m / d d / y y y y)	12 / 13 / 2010 (m m / d d / y y y y)	Direct Push

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _ _	_ _ _ _		_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: [X]) or Boring Location [X]
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____
Lat 43° 3 ' 4.4 "
Long 87° 59 ' 46.5"
Local Grid Location [X] N ☐ E _____ Feet ☐ S _____ Feet [X] W

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	0.0 - 0.5 (0-0.5)PAVEMENT(PA):Asphalt/pavement road base	PA									
			2	0.5 - 6.0 (0.5-6)Well graded SAND(SW):Dark brown, Clayey, Silty, SAND with trace Gravel. Medium grained and moist.	SW									
			4											
			6	6.0 - 16.0 (6-16)Well graded SAND(SW):Gravelly, Cobbly SAND. Medium to coarse grained. Loose. Interbedded stratified layers of poorly graded, medium grained Sand with no Gravel.	SW									
			8											
			10											
			12											
			14											
			16	16.0 - 24.0 (16-24)Well graded GRAVEL(GW):Cobbly GRAVEL with little Sand. Loose	GW									
			18											
			20											
			22											
			24											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Facility/Project Name: OHM-6140-Wauwatosa
Boring No. : DP-10/SG--3

License/Project/Monitoring No. :
WI Unique Well No. :

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in.)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			26	24.0 - 28.0 (24-28)Poorly graded SAND(SP):Brown, medium grained SAND. Loose, moist	SP									
			28	28.0 - 32.0 (28-32)Clayey SAND(SC):Grayish brown Clayey SAND. Slightly dense and most. Fining downward with increased Clay content	SC									
			30											
			32											

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Page 1 of _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		DP-11

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	11 / 18 / 2010	11 / 18 / 2010	Direct Push

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _	_ _ _ _		_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: ☒) or Boring Location ☒
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____
Lat 43° 3 ' 3.2 "
Long 87° 59 ' 0.02"

Local Grid Location
☒ N ☐ E
_____ Feet ☐ S _____ Feet ☒ W

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2	0.0 - 0.5 (0-0.5)PAVEMENT(PA): Asphalt, pavement road base.	PA									
			4	0.5 - 8.0 (0.5-8)Clayey SAND(SC):Clayey SAND with trace Gravel and Cobbles, slightly moist, slightly loose.	SC									
			6											
			8	8.0 - 27.0 (8-27)Gravelly SAND(SW):Gravelly SAND with some Cobbles. Medium grained, loose, dry. Decreasing gravel content downward.	SW									
			10											
			12											
			14											
			16											
			18											
			20											
			22											
			24											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Facility/Project Name: OHM-6140-Wauwatosa
Boring No. : DP-11

License/Project/Monitoring No. :
WI Unique Well No. :

Sample		Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			26											
				27.0 - 32.0 (27-32)Well graded SAND(SW): Brown, medium-grained SAND with trace Gravel. Loose and dry	SW									
			28											
			30											
			32											

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Page 1 of _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		SG-1

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	11/18/2010	11/18/2010	Direct Push

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: ☒) or Boring Location ☒
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____

Lat 43° 3 ' 3.4 "
Long 87° 59 ' 47.6"

Local Grid Location
_____ Feet ☐ S _____ Feet ☒ W
☒ N ☐ E

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	0.0 - 0.5 (0-0.5)PAVEMENT(PA):Pavement, asphalt	PA									
				0.5 - 1.0 (0.5-1)CONCRETE(CO):Concrete	CO									
			2	1.0 - 3.0 (1-3)Well graded SAND(SW):Brown SAND with some Silt, Gravel, and trace Cobbles. Fine to medium grained. Loose and moist	SW									
			4	3.0 - 6.0 (3-6)Clayey SAND(SC):Brown Clayey SAND with some Gravel.	SC									
			6	6.0 - 7.0 (6-7)Well graded SAND(SW):Light brown well graded SAND. Medium to fine grained, loose	SW									
			8											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Page 1 of _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		SG-2

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	11 / 18 / 2010	11 / 18 / 2010	Hand Auger

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _	_ _ _ _		_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: [X]) or Boring Location [X]
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____

Lat 43° 3 ' 4.2 "
Long 87° 59 ' 47.02

Local Grid Location
_____ Feet ☐ S _____ Feet [X] W
[X] N ☐ E

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2 4 6	0.0 - 1.0 (0-1)TOPSOIL(OL):Topsoil and organics 1.0 - 6.2 (1-6.2)Well graded SAND(SW):Brown SAND with some Gravel and trace Silt. Medium to coarse grained. Loose and slightly moist	OL SW									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Revelopment ☐ Other ☐ _____

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM-6140-Wauwatosa		SG-4

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
First Name: Mark Last Name: Montalvo Firm: Envirodynamics	11 / 18 / 2010 (m m / d d / y y y y)	11 / 18 / 2010 (m m / d d / y y y y)	Direct Push

WI Unique Well No.	DNR Well ID No.	Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
_ _ _ _ _ _ _	_ _ _ _ _		_____ Feet MSL	_____ Feet MSL	2.25 inches

Local Grid Origin ☐ (estimated: ☒) or Boring Location ☒
State Plane _____ N, _____ E
_____ 1/4 of _____ 1/4 of Section _____, T _____ N, R _____

Lat 43° 3 ' 4.2 "
Long 87° 59 ' 46.5"

Local Grid Location
☒ N ☐ E
_____ Feet ☐ S _____ Feet ☒ W

Facility ID	County	County Code	Civil Town/City/ or Village
	MILWAUKEE	41	Wauwatosa City

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth in Feet (Below ground surface)	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2 4 6 8	0.0 - 0.5 (0-0.5)PAVEMENT(PA):Asphalt, pavement road base 0.5 - 3.0 (0.5-3)Well graded SAND(SW):Reddish brown Gravelly SAND with Silt and Clay. Slightly moist. 3.0 - 7.0 (3-7)Poorly graded SAND(SP):Poorly graded SAND with little Clay. Very fine grained and slightly loose.	PA SW SP									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	Enviroforensics

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
OHM Wauwatosa	02-41-551923	DP-12

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Tony Kapugi On-Site	10/23/2012	10/23/2012	Direct Push

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
			Feet MSL	Feet MSL	2.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane N, E S/C/N
1/4 of 1/4 of Section , T N, R
Lat 43° 3' 4.1"
Long 87° 59' 46.5"
Local Grid Location ☐ N ☐ E Feet ☐ S Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
241287640	41		Wauwatosa

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	(0'-1') **CONCRETE:** Concrete parking area.	Concrete									
			1.5	(1'-2') **Gravel Roadbase:** Gravel Fill beneath concrete pad.	GW									
					OL			0.8						
			3.0	(2'-2.75') **ORGANIC(OL):**Highly ORGANIC Dark Brown Silty Clay, slightly stiff, moist.	ML/SC									
			4.5	(2.75'-5') **SILT(MLS):**Brown Sandy SILT, loose, fine Sand, dry.										
			6.0	(5'-7') **SAND(SP):**Brown SAND, fine grained, trace Silt, slightly moist.	SP									
			7.5	(7'-15') **SAND(SW):**Brown SAND, fine through large grained, with Gravel and Silt, slightly moist, loose.										
			9.0											
			10.5		SW			1.7						
			12.0											
			13.5											
			15.0	(15'-17.5') **SILT:**Brown Gravelly SILT, trace fine Sand, loose, slightly moist.	ML									
			16.5											
			18.0	(17.5'-27.5') **SAND:**Brown Gravelly SAND, fine through coarse grained, trace Silt, loose, moist.	SW									
			19.5											

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	Tel:
	Enviroforensics N16 W23390 Stone Ridge Dr Suite G Waukesha WI 53188	317-972-7870 Fax:

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number DP-12 Use only as an attachment to Form 4400-122. Page 2 of 2

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			21.0	(17.5'-27.5') **SAND:**Brown Gravelly SAND, fine through coarse grained, trace Silt, loose, moist. *(continued)*	SW									
			22.5											
			24.0											
			25.5											
			27.0											
			28.5	(27.5'-31') **SAND(SW):**Brown SAND, fine through coarse, no trace grains, loose, moist.	SW									
			30.0											
			31.5	(31'-33') **SAND(SP):**Brown SAND, fine grained, trace fine Gravel, loose, moist.	SP			0.4						
			33.0											
			34.5	(33'-35') **SAND(SW):**Grayish-Brown Gravelly SAND, fine through coarse grained, loose, moist.	SW									

APPENDIX B

Laboratory Report

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Mr. Collin Martin
Enviroforensics
602 N. Capitol Ave.
Suite 210
Indianapolis, IN 46204

July 18, 2016

EnvisionAir Project Number: 2016-406
Client Project Name: 6140

Dear Mr. Martin,

Please find the attached analytical report for the samples received July 5, 2016. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. EnvisionAir looks forward to working with you on your next project.

Yours Sincerely,

Stanley A. Hunnicutt

Stan Hunnicutt

Project Manager
EnvisionAir, LLC

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6140

Client Project Manager: COLLIN MARTIN

EnvisionAir Project Number: 2016-406

Sample Summary

Canister Pressure / Vacuum

Laboratory Sample Number:	Sample Description:	Matrix:	START Date Collected:	START Time Collected:	End Date Collected:	End Time Collected:	Date Received:	Time Received	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)
16-1431	6140-SVE-1D-2	A	6/28/16	11:20	6/28/16	11:27	7/5/16	15:14	-28	-2	-2
16-1432	6140-SVE-1D-3	A	6/28/16	12:41	6/28/16	12:47	7/5/16	15:14	-28	-3	-3
16-1433	6140-SVE-1S-2	A	6/28/16	18:25	6/28/16	18:30	7/5/16	15:14	-28	-4	-4
16-1434	6140-SVE-1S-3	A	6/29/16	8:18	6/29/16	8:23	7/5/16	15:14	-29	-4	-4

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6140

Client Project Manager: COLLIN MARTIN

EnvisionAir Project Number: 2016-406

Analytical Method: TO-15
Analytical Batch: 071116AIR

Client Sample ID: 6140-SVE-1D-2

Envision Sample Number: 16-1431
Sample Matrix: AIR

Sample Collection START Date/Time: 6/28/16 11:20
Sample Collection END Date/Time: 6/28/16 11:27
Sample Received Date/Time: 7/5/16 15:14

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 39.6	39.6	1
Tetrachloroethene	**1,000**	31.9	1
trans-1,2-Dichloroethene	< 39.6	39.6	1
Trichloroethene	< 10.7	10.7	1
Vinyl Chloride	< 6.4	6.4	1
4-bromofluorobenzene (surrogate)	85%		
Analysis Date/Time:	7-14-16/03:16		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6140

Client Project Manager: COLLIN MARTIN

EnvisionAir Project Number: 2016-406

Analytical Method: TO-15
Analytical Batch: 071116AIR

Client Sample ID: 6140-SVE-1D-3

Envision Sample Number: 16-1432
Sample Matrix: AIR

Sample Collection START Date/Time: 6/28/16 12:41
Sample Collection END Date/Time: 6/28/16 12:47
Sample Received Date/Time: 7/5/16 15:14

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 39.6	39.6	1
Tetrachloroethene	**1,120**	31.9	1
trans-1,2-Dichloroethene	< 39.6	39.6	1
Trichloroethene	< 10.7	10.7	1
Vinyl Chloride	< 6.4	6.4	1
4-bromofluorobenzene (surrogate)	85%		
Analysis Date/Time:	7-14-16/03:54		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6140

Client Project Manager: COLLIN MARTIN

EnvisionAir Project Number: 2016-406

Analytical Method: TO-15
Analytical Batch: 071116AIR

Client Sample ID: 6140-SVE-1S-2

Envision Sample Number: 16-1433
Sample Matrix: AIR

Sample Collection START Date/Time: 6/28/16 18:25
Sample Collection END Date/Time: 6/28/16 18:30
Sample Received Date/Time: 7/5/16 15:14

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 39.6	39.6	1
Tetrachloroethene	**17,100**	510	3
trans-1,2-Dichloroethene	< 39.6	39.6	1
Trichloroethene	< 10.7	10.7	1
Vinyl Chloride	< 6.4	6.4	1
4-bromofluorobenzene (surrogate)	86%		
Analysis Date/Time:	7-14-16/04:32		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Client Name: ENVIROFORENSICS

Project ID: 6140

Client Project Manager: COLLIN MARTIN

EnvisionAir Project Number: 2016-406

Analytical Method: TO-15
Analytical Batch: 071116AIR

Client Sample ID: 6140-SVE-1S-3

Envision Sample Number: 16-1434
Sample Matrix: AIR

Sample Collection START Date/Time: 6/29/16 8:18
Sample Collection END Date/Time: 6/29/16 8:23
Sample Received Date/Time: 7/5/16 15:14

Compounds	Sample Results ug/m³	Reporting Limit ug/m³	Flag
cis-1,2-Dichloroethene	< 39.6	39.6	1
Tetrachloroethene	**5,310**	128	2
trans-1,2-Dichloroethene	< 39.6	39.6	1
Trichloroethene	< 10.7	10.7	1
Vinyl Chloride	< 6.4	6.4	1
4-bromofluorobenzene (surrogate)	87%		
Analysis Date/Time:	7-14-16/05:10		
Analyst Initials	tjg		

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Analytical Report

TO-15 Quality Control Data

EnvisionAir Batch Number: 071116AIR

Method Blank (MB):	MB Results (ppbv)	Reporting Limit (ppbv)	Flags
cis-1,2-Dichloroethene	< 5	5	
Tetrachloroethene	< 0.47	0.47	
trans-1,2-Dichloroethene	< 10	10	
Trichlorethene	< 0.2	0.2	
Vinyl Chloride	< 0.5	0.5	
4-bromofluorobenzene (surrogate)	91%		
Analysis Date/Time:	7-13-16/07:36		
Analyst Initials	tjg		

LCS/LCSD	LCS Results (ppbv)	LCSD Results (ppbv)	LCS/D Conc(ppbv)	LCS Rec.	LCSD Rec.	RPD	Flag
Vinyl Chloride	8.82	8.74	10	88%	87%	0.9%	
trans-1,2-Dichloroethene	10.3	10.3	10	103%	103%	0.0%	
cis-1,2-Dichloroethene	9.66	9.61	10	97%	96%	0.5%	
Trichloroethene	9.6	9.54	10	96%	95%	0.6%	
Tetrachloroethene	11	11	10	110%	110%	0.0%	
4-bromofluorobenzene (surrogate)	91%	83%					
Analysis Date/Time:	7-13-16/05:36	7-13-16/06:19					
Analyst Initials	tjg	tjg					

EnvisionAir
1441 Sadlier Circle West Drive
Indianapolis, IN 46239
Ph: 317-351-0885
Fax: 317-351-0882
www.envision-air.com

Flag Number	Comments
1	Reported value is from a 10x dilution. TJG 7-18-16
2	Reported value is from a 40x dilution. TJG 7-18-16
3	Reported value is from a 160x dilution. TJG 7-18-16

EnvisionAir Proj#: 2016-406 Page 1 of 1

CHAIN OF CUSTODY RECORD

EnvisionAir | 1441 Sadlier Circle West Drive | Indianapolis, IN 46239 | Phone: (317) 351-0885 | Fax: (317) 351-0882

Client: NFO	P.O. Number: 20166646
Report Address: 602 N Capitol Ave Indianapolis IN 46204	Project Name or Number: 6140
Report To: Collin Martin	Sampled by: G. Schacht
Phone: 317-614-0594	QA/QC Required: (circle if applicable) Level III (Level IV)
Invoice Address: SAME	Reporting Units needed: (circle) (ug/m³) mg/m³ PPBV PPMV
Desired TAT: (Please Circle One) 1 day 2 days 3 days (Std (5 bus. days))	Media type: 1LC = 1 Liter Canister, 6LC = 6 Liter Canister, TB = Tedlar Bag, TD = Thermal Desorption Tube

REQUESTED PARAMETERS

TO-15 Full List

TO-15 Short List

ENVISIONAIR

www.envision-air.com

Sampling Type:
Soil-Gas: ☐
Sub-Slab: ☐
Indoor-Air: ☐

Canister Pressure / Vacuum

Air Sample ID	Media Type (see code above)	Coll. Date (Grab/Comp Start)	Coll. Time (Grab/Comp Start)	Coll. Date (Comp. End)	Coll. Time (Comp. End)	TO-15 Full List	TO-15 Short List			Canister Serial #	Flow Controller Serial #	Initial Field (in. Hg)	Final Field (in. Hg)	Lab Received (in. Hg)	EnvisionAir Sample Number
6140-SVE-1D-2	1LC	6-28-16	11:20	6-28-16	1127	X→				84046		-28	-2	-2	16-1431
6140-SVE-1D-3	1LC	6-28-16	12:41	6-28-16	12:47	X→				2219		-28	-3	-3	16-1432
6140-SVE-1S-2	1LC	6-28-16	18:25	6-28-16	1830	X→				83738		-28	-4	-4	16-1433
6140-SVE-1S-3	1LC	6-29-16	08:18	6-29-16	08:23	X→				83839		-29	-4	-4	16-1434

Comments:
Sample date for 6140-SVE-1S-3 is 6-29-16 / Samples collected during Pilot Testing Activities
• Run all samples for TO-15 Short List

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]		3:14	Blaine Carter	7/5/16	3:14

APPENDIX B

WDNR Form 4400-214D

Site Name: *One Hour Martinizing, Wauwatosa*
BRRTS #: *02-41-551923*
Type of Action: *Remediation*

Dry Cleaner Environmental Response Program
Reimbursement Cost Detail Linking Spreadsheet Form 4400-214D (R 08/12)

TASKS					DERF COST BREAKOUT (this claim)									
Bid / Budgeted Description	EnviroForensics Work Scope October 2018	Total Approved Budget	Previous Claims (If applicable)	Total Invoiced Costs	A Soil Investigation	B Soil Remediation	C Groundwater Investigation	D Groundwater Remediation	E Air/Vapor Investigation	F Air/Vapor Remediation	G Lab & Other Analysis	H Miscellaneous Costs	Budget Remaining Use (-) to indicate cost over-run	% Task Complete, Remarks
Consultant Costs														
23a -- SVE Remedial System Design	$ 19,591.00	$ 19,591.00		$ -									$ 19,591.00	100%
23b -- SVE Infrastructure Installation	$ 20,173.20	$ 20,173.20		$ -									$ 20,173.20	
23c -- SVE System Rental and O&M (one year)	$ 20,830.80	$ 20,830.80		$ -									$ 20,830.80	
23d -- Data Analysis and Bi-annual Reporting	$ 9,157.30	$ 9,157.30											$ 9,157.30	
23e -- Year End Confirmation Sampling	$ 8,408.85	$ 8,408.85		$ -									$ 8,408.85	
23f -- Project Management	$ 12,016.80	$ 12,016.80		$ -									$ 12,016.80	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
		$ -		$ -									$ -	
Consultant Cost Total	*$ 90,177.95*	$ 90,177.95	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	*$ 90,177.95*	
Sub-Contractor Costs														
SVE Upgrades and Infrastructure Installation	$ 50,760.00	$ 50,760.00		$ -									$ 50,760.00	
Private Utility Locates (2)	$ 1,200.00	$ 1,200.00											$ 1,200.00	
Electrical Installation	$ 8,000.00	$ 8,000.00											$ 8,000.00	
Sve Equipment Rental	$ 26,400.00	$ 26,400.00		$ -									$ 26,400.00	
Monthly Electrical Usage (12 months)	$ 8,400.00	$ 8,400.00		$ -									$ 8,400.00	
Telemetry Charges	$ 2,000.00	$ 2,000.00											$ 2,000.00	
Driller	$ 2,500.00	$ 2,500.00											$ 2,500.00	
Analytical Laboratory	$ 3,330.00	$ 3,330.00											$ 3,330.00	
Waste Water & Drill Cutting Disposal	$ 780.00	780											$ 780.00	
Sub-Contractor Cost Total	*$ 103,370.00*	*$ 103,370.00*	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	*$ 103,370.00*	
DERF ELIGIBLE SUB-TOTALS	**$ 193,547.95**	**$ 193,547.95**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 193,547.95**	

Non-DERF Eligible Expenses		
Attorney-Directed Tasks		$ -
Subcontractor Markup		$ -
Non-DERF Cost Total	$ -	$ -
INVOICE GRAND TOTAL	**$ -**	**$ -**

Total DERF Eligible Costs This Claim **$ -**

Check Numbers

APPENDIX C

Detailed Cost Breakdown Sheets

TABLE 1
COST ESTIMATE
OHM - Wauwatosa SVE Remediation With One Year O&M
Wauwatosa, WI

TASK	LABOR COSTS	SUB-CONTRACTOR COSTS	DIRECT COSTS	TOTAL COST
Phase 23a				
SVE System Design	$19,495.00	$0.00	$96.00	**$19,591.00**
Phase 23b				
SVE Infrastructure Installation	$18,620.00	$59,210.00	$1,553.20	**$79,383.20**
Phase 23c				
SVE System Rental and O&M for 12 Months	$16,520.00	$39,310.00	$4,310.80	**$60,140.80**
Phase 23d				
Data Analysis and Bi-annual Performance Reporting	$9,120.00	$0.00	$37.30	**$9,157.30**
Phase 23e				
Year End Confirmation Sampling	$7,530.00	$4,850.00	$878.85	**$13,258.85**
Phase 23f				
Project Management (through design and one year O&M)	$12,000.00	$0.00	$16.80	**$12,016.80**
TOTAL	**$83,285**	**$103,370**	**$6,893**	**$193,547.95**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23a SVE System Design

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr. Engineer	$ 155.00	hr					$0.00	
Sr Project Manager	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr					$0.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr					$0.00	
Health & Safety Specialist	$ 130.00	hr					$0.00	
							$0.00	**$0.00**

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr	3.0				$525.00	
Sr. Engineer	$ 155.00	hr	12.0				$1,860.00	
Sr Project Manager	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr	90.0				$13,950.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr	15.0				$1,800.00	
Field Professional	$ 95.00	hr					$0.00	
Drafting	$ 85.00	hr	16.0				$1,360.00	
Admin	$ 65.00	hr					$0.00	
Health & Safety Specialist	$ 130.00	hr					$0.00	
							$19,495.00	**$19,495.00**

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate		LS		1.00			$0.00	
Driller		LS		1.00			$0.00	
Surveyor		LS		1.00			$0.00	
Waste Disposal		LS		1.00			$0.00	
Historical Database Report		LS		1.00			$0.00	
Remediation		LS		1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
							$0.00	**$0.00**

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal
Soil VOC 8260 dry wt	$ 83.50	ea		1.00			$0.00
Soil VOC 8260 dry wt QA/QC	$ 83.50	ea		1.00			$0.00
GW VOC 8260	$ 70.00	ea		1.00			$0.00
GW VOC 8260 QA/QC	$ 70.00	ea		1.00			$0.00
Air TO-15 – Soil Gas	$ 200.00	ea		1.00			$0.00
Air TO-15 – Sub-Slab	$ 200.00	ea		1.00			$0.00
Air TO-15 – Indoor Air	$ 200.00	ea		1.00			$0.00
Air - Individual Certification	$ 50.00	ea		1.00			$0.00
Air - Batch Certification	$ 50.00	LS		1.00			$0.00
Trip Blank VOCs 8260	$ 70.00	ea		1.00			$0.00
Level IV QA/QC (15%)							$0.00
							$0.00 **$0.00**

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal
Hotel	$ 120.00	day		1.00			$0.00
Meals	$ 67.00	LS		1.00			$0.00
Misc Materials		LS		1.00			$0.00
Equipment Rental		LS		1.00			$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00 **$0.00**

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00	$ 0.50			$ 65.00	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00				$ -	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	De-scaler			$ 100.00					
	Data Logger with Transducer			$ 155.00				$ -	
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	Padlocks	$ 15.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	PDB Harness	$ 80.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00				$ -	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45						$ -	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	55-Gallon Drum	$ 55.00						$ -	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00				$ -	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00						$ -	
	Sub-Slab Cover (Stainless Steel)	$ 40.00						$ -	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00				$ -	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00						$ -	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00				$ -	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00						$ -	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00				$ -	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	40					$ 16.00	
	B/W Copies	$ 0.25						$ -	
	Document - Format/Sending	$ 15.00	1					$ 15.00	
	Report CD Copy	$ 5.00						$ -	
								$ 96.00	$96.00
	PHASE TOTAL								**$19,591.00**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23b SVE Infrastructure Installation

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr	12.0				$1,860.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr	66.0				$7,920.00	
Field Professional	$ 95.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$9,780.00	**$9,780.00**

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr	8.0				$1,240.00	
Sr Professional	$ 155.00	hr	14.0				$2,170.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr	16.0				$2,080.00	
Staff Professional	$ 120.00	hr	16.0				$1,920.00	
Field Professional	$ 95.00	hr	6.0				$570.00	
Drafting	$ 85.00	hr	4.0				$340.00	
Admin	$ 65.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr	4.0				$520.00	
		hr					$0.00	
							$8,840.00	**$8,840.00**

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate	$ 450.00	LS	1.0	1.00			$450.00	
Driller/Contractor	$ 38,840.00	LS	1.0	1.00			$38,840.00	
SVE Sound Insulation	$ 3,305.00	LS	1.0	1.00			$3,305.00	
SVE Telemetry and Controls	$ 2,138.00	LS	1.0	1.00			$2,138.00	
SVE System Functional Testing	$ 3,340.00	LS	1.0	1.00			$3,340.00	
SVE System Delivery to Site	$ 3,137.00	LS	1.0	1.00			$3,137.00	
		LS	1.0	1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
Electrical Contractor for Supply and Connections	$ 8,000.00	LS	1.0	1.00			$8,000.00	
							$59,210.00	**$59,210.00**

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal
Soil VOC 8260 dry wt	$ 83.50	ea		1.00			$0.00
Soil VOC 8260 dry wt QA/QC	$ 83.50	ea		1.00			$0.00
GW VOC 8260	$ 70.00	ea		1.00			$0.00
GW VOC 8260 QA/QC	$ 70.00	ea		1.00			$0.00
Air TO-15 -- Soil Gas	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Sub-Slab	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Indoor Air	$ 200.00	ea		1.00			$0.00
Air - Individual Certification	$ 50.00	ea		1.00			$0.00
Air - Batch Certification	$ 50.00	LS		1.00			$0.00
Trip Blank VOCs 8260	$ 70.00	ea		1.00			$0.00
Level IV QA/QC (15%)							$0.00
							$0.00 **$0.00**

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal
Hotel		day		1.00			$0.00
Meals		LS		1.00			$0.00
Misc Materials (PVC piping manifold and valves)	$ 300.00	LS	1.0	1.00			$300.00
Equipment Rental		LS		1.00			$0.00
		LS		1.00			$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$300.00 **$300.00**

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00	$ 6.50			$ 845.00	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00				$ -	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	Data Logger with Transducer			$ 155.00				$ -	
	De-scaler			$ 100.00					
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Padlocks	$ 15.00	2					$ 30.00	
	PDB Harness	$ 80.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00				$ -	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45						$ -	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	55-Gallon Drum	$ 55.00						$ -	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00				$ -	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00						$ -	
	Sub-Slab Cover (Stainless Steel)	$ 40.00						$ -	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00	$ 1.00			$ 15.00	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00						$ -	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00	$ 5.00			$ 50.00	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00	1					$ 10.00	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00	$ 6.00			$ 300.00	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	8					$ 3.20	
	B/W Copies	$ 0.25						$ -	
	Document - Format/Sending	$ 15.00						$ -	
	Report CD Copy	$ 5.00						$ -	
								$ 1,253.20	$1,253.20
	PHASE TOTAL								**$79,383.20**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23c SVE System Rental and O&M for 12 Months

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr					$0.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr	16.0				$2,080.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr	56.0				$5,320.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$7,400.00	**$7,400.00**

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr	8.0				$1,240.00	
Sr Professional	$ 155.00	hr	12.0				$1,860.00	
Project Manager	$ 130.00	hr	12.0				$1,560.00	
Project Professional	$ 130.00	hr	8.0				$1,040.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr	36.0				$3,420.00	
Drafting	$ 85.00	hr					$0.00	
Admin	$ 65.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$9,120.00	**$9,120.00**

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate		LS		1.00			$0.00	
Driller		LS		1.00			$0.00	
Surveyor		LS		1.00			$0.00	
Waste Disposal	$ 130.00	drum	4.0	1.00			$520.00	
Historical Database Report		LS		1.00			$0.00	
VPS SVE Equipment Rental	$ 2,200.00	month	12.0	1.00			$26,400.00	
Electrical Usage	$ 700.00	month	12.0	1.00			$8,400.00	
Telemetry Charges	$ 2,000.00	LS	1.0	1.00			$2,000.00	
				1.00			$0.00	
				1.00			$0.00	
							$37,320.00	**$37,320.00**

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal
Soil VOC 8260 dry wt	$ 83.50	ea		1.00			$0.00
Soil VOC 8260 dry wt QA/QC	$ 83.50	ea		1.00			$0.00
GW VOC 8260	$ 70.00	ea		1.00			$0.00
GW VOC 8260 QA/QC	$ 70.00	ea		1.00			$0.00
Air TO-15 -- Soil Gas	$ 180.00	ea		1.00			$0.00
Air TO-15 -- SVE Effluent	$ 90.00	ea	17.0	1.00			$1,530.00
Air TO-15 -- outdoor Air	$ 180.00	ea	2.0	1.00			$360.00
Air - Individual Certification	$ 50.00	ea	2.0	1.00			$100.00
Air - Batch Certification	$ 50.00	LS		1.00			$0.00
Trip Blank VOCs 8260	$ 70.00	ea		1.00			$0.00
							$1,990.00	**$1,990.00**

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal	
Hotel	$ 120.00	day		1.00			$0.00	
Meals	$ 67.00	LS		1.00			$0.00	
Misc Materials	$ 500.00	LS	1.0	1.00			$500.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
							$0.00	
							$0.00	
							$0.00	
							$500.00	**$500.00**

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00	$ 12.50			$ 1,625.00	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00	$ 6.00			$ 1,050.00	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	Data Logger with Transducer			$ 155.00				$ -	
	De-scaler			$ 100.00					
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Padlocks	$ 15.00						$ -	
	PDB Harness	$ 80.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00	$ 0.50			$ 85.00	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45						$ -	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	55-Gallon Drum	$ 55.00						$ -	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00	$ 2.00			$ 60.00	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00	2					$ 150.00	
	Sub-Slab Cover (Stainless Steel)	$ 40.00	2					$ 80.00	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00				$ -	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00	1					$ 105.00	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00				$ -	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00	2					$ 20.00	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00	$ 12.50			$ 625.00	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	12					$ 4.80	
	B/W Copies	$ 0.25	24					$ 6.00	
	Document - Format/Sending	$ 15.00						$ -	
	Report CD Copy	$ 5.00						$ -	
								$ 3,810.80	$3,810.80
	PHASE TOTAL								**$60,140.80**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23d Data Analysis and Bi-annual Performance Reporting

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr					$0.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$0.00	**$0.00**

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr	4.0				$700.00	
Sr Engineer	$ 155.00	hr	8.0				$1,240.00	
Sr Professional	$ 155.00	hr	12.0				$1,860.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr	24.0				$3,120.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr	16.0				$1,520.00	
Drafting	$ 85.00	hr	8.0				$680.00	
Admin	$ 65.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$9,120.00	**$9,120.00**

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate		LS		1.00			$0.00	
Driller		LS		1.00			$0.00	
Surveyor		LS		1.00			$0.00	
Waste Disposal		LS		1.00			$0.00	
Historical Database Report		LS		1.00			$0.00	
Remediation		LS		1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
							$0.00	**$0.00**

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal
Soil VOC 8260 dry wt	$ 83.50	ea		1.00			$0.00
Soil VOC 8260 dry wt QA/QC	$ 83.50	ea		1.00			$0.00
GW VOC 8260	$ 70.00	ea		1.00			$0.00
GW VOC 8260 QA/QC	$ 70.00	ea		1.00			$0.00
Air TO-15 -- Soil Gas	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Sub-Slab	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Indoor Air	$ 200.00	ea		1.00			$0.00
Air - Individual Certification	$ 50.00	ea		1.00			$0.00
Air - Batch Certification	$ 50.00	LS		1.00			$0.00
Trip Blank VOCs 8260	$ 70.00	ea		1.00			$0.00
Level IV QA/QC (15%)							$0.00
							$0.00 **$0.00**

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal
Hotel	$ 120.00	day		1.00			$0.00
Meals	$ 67.00	LS		1.00			$0.00
Misc Materials		LS		1.00			$0.00
Equipment Rental		LS		1.00			$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00 **$0.00**

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00				$ -	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00				$ -	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	Data Logger with Transducer			$ 155.00				$ -	
	De-scaler			$ 100.00					
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Padlocks	$ 15.00						$ -	
	PDB Harness	$ 80.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00				$ -	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45						$ -	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	55-Gallon Drum	$ 55.00						$ -	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00				$ -	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00						$ -	
	Sub-Slab Cover (Stainless Steel)	$ 40.00						$ -	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00				$ -	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00						$ -	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00				$ -	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00						$ -	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00				$ -	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	12					$ 4.80	
	B/W Copies	$ 0.25	10					$ 2.50	
	Document - Format/Sending	$ 15.00	2					$ 30.00	
	Report CD Copy	$ 5.00						$ -	
								$ 37.30	$37.30
	PHASE TOTAL								**$9,157.30**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23e Year End Confirmation Sampling

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr					$0.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr	16.0				$1,520.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$1,520.00	**$1,520.00**

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr	2.0				$350.00	
Sr Engineer	$ 155.00	hr	4.0				$620.00	
Sr Professional	$ 155.00	hr	20.0				$3,100.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr	12.0				$1,560.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr	4.0				$380.00	
Drafting	$ 85.00	hr					$0.00	
Admin	$ 65.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$6,010.00	**$6,010.00**

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate	$ 750.00	LS	1.0	1.00			$750.00	
Driller	$2,500.00	LS	1.0	1.00			$2,500.00	
Surveyor		LS		1.00			$0.00	
Waste Disposal	$ 130.00	drum	2.0	1.00			$260.00	
Historical Database Report		LS		1.00			$0.00	
Remediation		LS		1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
							$3,510.00	**$3,510.00**

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal	
Soil VOC 8260 dry wt	$ 70.00	ea	12.0	1.00			$840.00	
Soil VOC 8260 dry wt QA/QC		ea		1.00			$0.00	
GW VOC 8260		ea		1.00			$0.00	
GW VOC 8260 QA/QC		ea		1.00			$0.00	
Air TO-15 -- Soil Gas		ea		1.00			$0.00	
Air TO-15 -- Sub-Slab	$ 90.00	ea	5.0	1.00			$450.00	
Air TO-15 -- Indoor Air		ea		1.00			$0.00	
Air - Individual Certification		ea		1.00			$0.00	
Air - Batch Certification	$ 50.00	LS	1.0	1.00			$50.00	
Trip Blank VOCs 8260		ea		1.00			$0.00	
							$1,340.00	**$1,340.00**

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal	
Hotel	$ 120.00	day		1.00			$0.00	
Meals	$ 67.00	LS		1.00			$0.00	
Misc Materials		LS		1.00			$0.00	
Equipment Rental		LS		1.00			$0.00	
							$0.00	
							$0.00	
							$0.00	
							$0.00	
							$0.00	
							$0.00	**$0.00**

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00	$ 2.00			$ 260.00	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00	$ 2.00			$ 350.00	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	Data Logger with Transducer			$ 155.00				$ -	
	De-scaler			$ 100.00					
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Padlocks	$ 15.00						$ -	
	PDB Harness	$ 80.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00				$ -	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45	5					$ 22.25	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	55-Gallon Drum	$ 55.00	2					$ 110.00	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00				$ -	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00						$ -	
	Sub-Slab Cover (Stainless Steel)	$ 40.00						$ -	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00	$ 1.00			$ 15.00	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00						$ -	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00	$ 1.00			$ 10.00	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00	1					$ 10.00	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00	$ 2.00			$ 100.00	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	4					$ 1.60	
	B/W Copies	$ 0.25						$ -	
	Document - Format/Sending	$ 15.00						$ -	
	Report CD Copy	$ 5.00						$ -	
								$ -	$ 878.85
	PHASE TOTAL								**$13,258.85**

Project Title: OHM - Wauwatosa
Project Number/Name: 6140
Date: 9/17/2018

Phase 23f Project Management (through design and one year O&M)

Labor - Field	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr					$0.00	
Sr Engineer	$ 155.00	hr					$0.00	
Sr Professional	$ 155.00	hr					$0.00	
Project Manager	$ 130.00	hr					$0.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr					$0.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$0.00	$0.00

Labor - Office/Reporting	Price	Unit	# Units				Subtotal	Task Total
Director Technical Services	$ 175.00	hr	4.0				$700.00	
Sr Engineer	$ 155.00	hr	12.0				$1,860.00	
Sr Project Manager	$ 155.00	hr	24.0				$3,720.00	
Project Manager	$ 130.00	hr	38.0				$4,940.00	
Project Professional	$ 130.00	hr					$0.00	
Staff Professional	$ 120.00	hr					$0.00	
Field Professional	$ 95.00	hr					$0.00	
Drafting	$ 85.00	hr					$0.00	
Admin	$ 65.00	hr	12.0				$780.00	
Health and Safety Specialist	$ 130.00	hr					$0.00	
		hr					$0.00	
							$12,000.00	$12,000.00

Contractors/Consultants	Price	Unit	# Units	Markup			Subtotal	Task Total
Utility Locate		LS		1.00			$0.00	
Driller		LS		1.00			$0.00	
Surveyor		LS		1.00			$0.00	
Waste Disposal		LS		1.00			$0.00	
Historical Database Report		LS		1.00			$0.00	
Remediation		LS		1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
				1.00			$0.00	
							$0.00	$0.00

Contractor/Consultant - Laboratory	Price	Unit	# Units	Markup			Subtotal
Soil VOC 8260 dry wt	$ 83.50	ea		1.00			$0.00
Soil VOC 8260 dry wt QA/QC	$ 83.50	ea		1.00			$0.00
GW VOC 8260	$ 70.00	ea		1.00			$0.00
GW VOC 8260 QA/QC	$ 70.00	ea		1.00			$0.00
Air TO-15 -- Soil Gas	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Sub-Slab	$ 200.00	ea		1.00			$0.00
Air TO-15 -- Indoor Air	$ 200.00	ea		1.00			$0.00
Air - Individual Certification	$ 50.00	ea		1.00			$0.00
Air - Batch Certification	$ 50.00	LS		1.00			$0.00
Trip Blank VOCs 8260	$ 70.00	ea		1.00			$0.00
Level IV QA/QC (15%)							$0.00
							$0.00 $0.00

Direct Costs - Expenses	Price	Unit	# Units	Markup			Subtotal
Hotel	$ 120.00	day		1.00			$0.00
Meals	$ 67.00	LS		1.00			$0.00
Misc Materials		LS		1.00			$0.00
Equipment Rental		LS		1.00			$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00
							$0.00 $0.00

	Direct Costs - Chargeable Equipment Expense	Rate (hr/unit)	# Hrs/Units	Rate (day/use)	# days/use	Rate (weeks/use)	# weeks/use	Subtotal	
Vehicles	Field Vehicle - Full Day	$ 20.00		$ 130.00				$ -	
	Support Vehicle - Full Day	$ 30.00		$ 180.00				$ -	
	Mileage at Federal IRS Reimbursement Rate (used only for daily use over 230 miles)	$ 0.545						$ -	
Meters	Air Velocity Meter (per use)			$ 25.00				$ -	
	Multi-meter Conductivity/pH/Temp/TDS			$ 165.00				$ -	
	Dissolved Oxygen Meter			$ 40.00				$ -	
	FID Foxboro/Sensidyne (TIP)			$ 155.00				$ -	
	Flow Calibrator			$ 30.00				$ -	
	Methane Meter			$ 116.00				$ -	
	PID or 580 OVM			$ 120.00				$ -	
	Turbidity Meter			$ 30.00				$ -	
	ppb RAE			$ 175.00				$ -	
	Ozone Leak Detector			$ 135.00				$ -	
	Inline Ozone Meter			$ 230.00				$ -	
	ORP Meter			$ 30.00				$ -	
Pumps	Air Pump - Low Flow (Barcad)			$ 25.00				$ -	
	Development Pump			$ 130.00				$ -	
	Electric Submersible Pump with Control Box (Units)			$ 130.00				$ -	
	Low-Flow Sampling Bladder	$ 12.00						$ -	
	Peristaltic Pump			$ 105.00				$ -	
	Pumping Test Accessory Equipment (Flow Meters/Manifolds/Tubing)	$ 100.00						$ -	
	Portable SVE Unit - 1.5 HP			$ 155.00				$ -	
	Intrinsically Safe Vapor Evacuation Blower			$ 125.00				$ -	
	Pneumatic Low-Flow Pump - 1" Well			$ 50.00				$ -	
	Pneumatic Low-Flow Sampling Kit w/ Flow Cell and Multimeter			$ 270.00				$ -	
Other	Asbestos Sampling Kit			$ 250.00				$ -	
	Asbestos Investigation Supplies			$ 130.00				$ -	
	Asbestos Sampling Core	$ 2.50						$ -	
	Backpack Blower			$ 75.00		$ 200.00		$ -	
	Bailers (Disposable)	$ 10.00						$ -	
	Bailers (Non-Disposable)			$ 15.00				$ -	
	Core Boxes	$ 10.00						$ -	
	Core Sampler			$ 55.00				$ -	
	Data Logger with Transducer			$ 155.00				$ -	
	De-scaler			$ 100.00					
	Well Caps	$ 30.00						$ -	
	Elec. Well Sounder (Probe)			$ 30.00				$ -	
	Metal Detector			$ 50.00				$ -	
	Nitrile Sampling Gloves (Disposable)	$ 0.13						$ -	
	5035 Sample Kit	$ 16.00						$ -	
	P/T Plugs	$ 5.00						$ -	
	Field Book	$ 11.00						$ -	
	Filter - Large	$ 18.00						$ -	
	Filter - Small	$ 9.00						$ -	
	Generator			$ 105.00				$ -	
	Hand Auger			$ 30.00				$ -	
	Helium QA/QC Kit			$ 265.00				$ -	
	Helium QA/QC Accessories	$ 20.00						$ -	
	Oil/Water Interface Probe			$ 105.00				$ -	
	Padlocks	$ 15.00						$ -	
	PDB Harness	$ 80.00						$ -	
	Passive Diffusion Bag	$ 35.00						$ -	
	Steam Cleaner			$ 130.00				$ -	
	Transducer (ea)			$ 40.00				$ -	
	Coring Machine			$ 200.00				$ -	
	Rotary Hammer Drill			$ 170.00				$ -	
	Hand Drill			$ 75.00				$ -	
	NAPL Sample Kit			$ 40.00				$ -	
	Surveying Equipment			$ 50.00		$ 200.00		$ -	
	SVE Inlet Air Filter			$ 80.00				$ -	
	SVE Dilution Air Filter			$ 28.00				$ -	
	SVE Blower Oil (quart)			$ 32.00				$ -	
	SVE Blower Grease (tube)			$ 20.00				$ -	
	O2 Meter			$ 50.00		$ 175.00		$ -	
	Ozone Air Filter Holder			$ 18.00				$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 3/8" OD (per foot)	$ 1.50						$ -	
	Tubing (Bonded) - Polyethylene (Teflon): 1/4" OD X 1/4" OD (per foot)	$ 1.20						$ -	
	Tubing (Bonded) - Polyethylene (Teflon) : 1/16" OD X 1/4" (per foot)	$ 1.25						$ -	
	Tubing (Bonded) - Polyethylene: 1/4" OD X 3/8" OD (per foot)	$ 1.10						$ -	
	Tubing - Polyethylene: 1/4" OD (per foot)	$ 0.60						$ -	
	Tubing - Polyethylene: 1/2" OD (per foot)	$ 0.85						$ -	
	Tubing - Tygon: 3/8" STD (per foot)	$ 4.45						$ -	
	Tubing - Silicone: 3/8" STD (per foot)	$ 4.50						$ -	
	System Wiring (per foot)	$ 0.60						$ -	
	PFA Tubing - 1/2-inch ID	$ 5.00						$ -	
	Manual Drive Point Kit	$ 90.00						$ -	
	55-Gallon Drum	$ 55.00						$ -	
	550 gal poly tank			$ 40.00				$ -	
	325 gal poly tank			$ 30.00				$ -	
	Temporary Sampling Port	$ 25.00						$ -	
	Trimmer			$ 50.00					
	Vapor Pin Sub-Slab Sampling Port	$ 75.00						$ -	
	Sub-Slab Cover (Stainless Steel)	$ 40.00						$ -	
	Well abandonment kit	$ 25.00						$ -	
	Well Cover 8X12"	$ 105.00						$ -	
	Measuring Wheel			$ 15.00				$ -	
	Measuring Wheel or Pole			$ 15.00				$ -	
	Camera			$ 25.00				$ -	
	1L Tedlar Bag	$ 20.00						$ -	
	Radon Sample Kit	$ 30.00						$ -	
	HAZMAT Exemption Shipper	$ 40.00						$ -	
	Manometers	$ 105.00						$ -	
	Westlaw	$ 105.00						$ -	
	CAD/drafting/graphics	$ 90.00						$ -	
Safety	Barricades & Traffic Signs			$ 10.00				$ -	
	Fall Protection			$ 25.00				$ -	
	Gloves (Chemical Resistant)	$ 10.00						$ -	
	Level "B": Level "C1" plus SCBA			$ 210.00				$ -	
	Level "C1": Level "C2" plus Polycoat Suit			$ 85.00				$ -	
	Level "C2": Level "D" plus Respirator			$ 40.00				$ -	
	Standby SCBA			$ 130.00				$ -	
	Routine Field and Safety Equipment			$ 50.00				$ -	
Production	1 Inch Binder	$ 9.00						$ -	
	2 Inch Binder	$ 12.00						$ -	
	3 Inch Binder	$ 15.00						$ -	
	4 Inch Binder	$ 22.00						$ -	
	Binder Tabs (Set of 8)	$ 5.00						$ -	
	Color Copies	$ 0.40	12					$ 4.80	
	B/W Copies	$ 0.25	48					$ 12.00	
	Document - Format/Sending	$ 15.00						$ -	
	Report CD Copy	$ 5.00						$ -	
								$ 16.80	$16.80
	PHASE TOTAL								**$12,016.80**